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Friction and Wear of Bearings.

M. C. KUNZEL has tabulated the results of experiments made on the effects of friction between various substances. The heat produced, other conditions being equal, is in proportion to the hardness of the substances; and, on the other hand, the greater the difference in the hardness of two substances rubbing against each other, the less the heat produced by the friction, and the harder of the two heats more than the other. If friction takes place between glass and cork the amount of heat received by the two respectively is as seven to one, and between bronze and cork, four to one.

For durability alone, of course, bearings should be of metal as hard as that of the arbors which they support, but considering the wear of the latter the former should be as soft as possible. In practice, however, certain precautions are to be observed; the bearing must not cut the arbor, and it must wear as little as possible; it should not get hot even when lubrication fails, and, lastly, it should possess resistance enough to bear all the shocks that fall upon it without being deformed or broken. The alloys of copper and tin generally in use, are rarely homogeneous, with the exception of that which contains eighty-two to eighty-three parts of copper to seventeen or eighteen of tin. When there is less tin in the composition granulation takes place during cooling, which alters the homogeneousness of the alloy, and causes the cutting both of bearing and arbor. When an alloy of copper and tin sets slowly the first part consolidated is a very soft alloy not containing more than 7 to 10 per cent. of tin; this forms, as it were, the shell of the bearing, while the hard alloy containing seventeen to eighteen parts of tin, sets afterwards and fills up the shell. When a bearing thus formed is in work the soft alloy soon gives way, and the hard grains within attack the arbor and are often torn out and carried away when grease fails.

A good bearing should be the very opposite of the above; its shell should be very hard and durable, and the interior filled up with a softer composition. This result is attempted to be obtained by fusing together several alloys of different compositions and degrees of fusibility, so as to produce by cooling two given alloys, but the operation is delicate and the result uncertain. Phosphorus bronze succeeds best in this way; the shell is then entirely formed of very hard bronze, and the interior of a soft alloy of copper and tin. The bearing may then be considered as a series of layers of soft metal enclosed in a casing of metal almost as hard as the arbor itself. The microscope reveals this disposition very evident; and if one of these bearings be carefully submitted to heat, to cause the soft metal to run, the rest remains in the form of a spongy mass.

The results obtained with various kinds of bearings used on the Belgian and German railways are thus given:—Bronze composed of 83 parts of copper and 17 of tin, costs 3 fr. 25c. per kilogramme, and wears at the rate 11·6 grammes for four bearings per 1000 kilometres, the cost being 0·037 fr.; bronze containing 82 parts of copper and 18 of tin costs 0·032 fr.; the same applied to carriages with brakes, wears at the rate of 109·5 grammes, and costs 0·335 fr.; white metal, composed of 3 parts of copper, 90 of tin, and 7 of antimony; costs 3 fr. 73c., wears at the rate of 14·8 grammes, and costs 0·055 fr.; ditto containing copper 5, tin 85, and antimony 10 parts, costs 3 fr. 66c., wears at the rate of 11·3 grammes, and costs 0·041 fr.; ditto composed of lead 84, and antimony 16 parts costs 1 fr. 48c., wears at the rate of 12·2 grammes, and the expense is 0·018 fr. per 1000 kilometres; lastly, phosphorus bronze costs 4 fr. 37c., wears at the rate of 2·3 grammes, and the expense is 0·010 fr. only, but when applied to carriages with brakes, the wear rises to 9·5 grammes, and the expense to 0·041 fr.—*Iron.*

Recent Improvements in Bessemer Machinery.

BY A. L. HOLLEY, C. E., BROOKLYN, N. Y.*

With Supplement.

THE members of the society are doubtless aware that the production of American Bessemer steel works is constantly increasing; that the same converters and machinery are doing more work every year. This enlarged output is due to various causes, chiefly the following:

1st. Better organization—better knowledge, on the part of both managers and men, of the plant and the process; of the way to economize the more exhausting labor, and of the arrangement of the details of labor and operations so that they shall not conflict; also, more pluck—a greater willingness to take risks, or, more properly, such an intimate knowledge of the nature and capacities of the refractory linings in various stages of disrepair, and the probable behavior of the fluid metal at various stages of its treatment, that the precise nature of the risk may be better known, so that the works may be crowded to their full capacity. In the early practice, after getting four or five consecutive heats in a day, the men preferred to "let well enough alone," and to devote the remaining time to preparation for another turn. Now, thirty, and sometimes forty heats are regularly made during the twenty-four hours, day after day, without the frequent occurrence and without the fear of breakdowns or "messes," as the spilling of steel charges was graphically named in Sheffield.

2d. Although no new refractory materials have been developed, improved means of preparing such as we have, and of imbedding them in the walls of vessels and ladles, have contributed not a little to the regularity and increase of production.

3d. The principal cause of the present enlarged and regular output of Bessemer works undoubtedly lies in numerous improvements in mechanical details. Few of these improvements are revolutionary, or even of very striking importance by themselves; but as they are quite numerous and pertain to all stages of the manufacture, and to all departments of the plant, they are in the aggregate fully competent to account for the very marked progress of the past few years.

I desire to call your attention at this time to a few of the more important of these improved mechanical details, and to the practice to which they have led.

First. The melting department has been the subject of considerable changes. The air-furnace, not yet wholly disused abroad for melting the charges, was thrown out almost at the beginning of our practice in this country, because it required four times as much fuel as the cupola; because it would largely increase the cost of plant—some ten of the standard air-furnaces with their large elevated floor space and extensive foundations and buildings, would but do the work of three standard cupolas—and because it was soon ascertained that with good fuel, which is plentiful, the quality of the iron was not practically impaired by cupola melting. So the standard foundry cupola, the MacKensie, Fig. 1, (see supplement), was adopted. Although this furnace was of a size sufficient to melt five tons an hour, it would only work at this rate for one or two hours, under the necessary Bessemer conditions, viz., all pig, covered with much sand, to be delivered hot and in regular quantities. And after delivering fifteen or twenty tons it would scaffold across and stop altogether. The foundry practice requires a rapid and constant delivery for a short time; the Bessemer requires large taps (to keep the iron hot) at considerable intervals, the delivery to be maintained at the rate of eight to ten tons an hour for twenty-four consecutive hours. A larger foundry cupola might have melted iron enough, but would have delivered it faster than it could have been converted. It was soon evident that the cupola furnace must be specially adapted to these new conditions, chiefly in two ways; there must be room to hold large charges, and more especially, room to hold a considerable accumulation of slag, and such an internal shape and tuyere arrangement as to prevent scaffolding and the stoppage of blast. MACKENSIE'S elliptical cross-section (designed to shorten the travel of the blast to the center of the cupola) was retained, but his annular tuyere, which could not be got at for cleaning throughout its whole circumference, was replaced by six oval tuyeres, the united area of which was twice that of the foundry cupola of the same diameter, so that the partial stopping of the tuyeres should not seriously check the blast. Convenient means were arranged to clean the tuyeres, or to remove them and put in others while the furnace was running. The principal change was elevating the tuyeres some three feet from the tap-hole, instead of one foot, as in the foundry practice, thus forming a large hearth or crucible. The result was that the furnace, otherwise the same as before, would melt forty to fifty tons of pig in eight or ten hours. There was room during the first few hours for several tons of iron to accumulate for each tap, and thus to keep hotter than if it were almost constantly running in a small stream into the ladle. The slag was, by the same means, kept more fluid, so that more of it would follow out the iron. The considerable settling—one or two feet—of the superincumbent charges, when the iron was tapped, exercised a scouring action and tended to prevent scaffolding. And there was room in the hearth for all the slag that would form in a turn's work. But this storing of slag was at the expense of storing iron, and the taps became smaller and cooler, and at last the old difficulties set in, and the melting was stopped by scaffolding.

*A paper read before the American Institute of Mining Engineers at the New York meeting, February, 1874.

The increased converting capacity soon rendered it necessary to still further improve the cupola, and as the slag was the cause of the trouble, it was evidently best to get rid of it somehow, as fast as it was produced, by tapping it off if possible. So a slag tap-hole was placed a few inches below the tuyeres, but a somewhat serious difficulty was encountered. During all the early trials the slag would not run out, and although the problem seemed a simple one, it was not solved without some months of experimenting. A certain amount of limestone flux was found necessary to make the slag fusible, and thus to keep it fluid; a certain regulation of the fuel charges and of the tapping were finally got at, and the slag tap-hole was kept hot (so that it would not chill the slag) by allowing the flame to blow through it while the slag was not running through it. The slag would then rise on the top of the iron as it accumulated in the hearth, and would, with a little assistance, or without any assistance, when the furnace was working properly, run out of the slag-hole. When the iron began to show with the slag, the iron-tap was opened, the hearth emptied, and the operation repeated.

The cupola now generally adopted is shown in vertical section by Fig. 2, and in several cross-sections by Fig. 3. The minimum internal diameter is from 4½ to 5 feet; the height of tuyeres is about 4 feet. The upper slag tap-hole is the one ordinarily used, the lower one is for experiment. The elliptical cross-section is abandoned; it seems to have no practical advantages for furnaces of this size, and the lining of the flat sides is maintained with difficulty. It will be observed that the diameter of the furnace is but slightly reduced at the boshes. The result is that the lining above the tuyeres is so much burned away after twenty-four hours' running as to require patching. Restoring the inclined boshes, giving the walls somewhat the shape they would tend to assume, will doubtless remedy this difficulty without promoting the formation of a scaffold, now that the slag can be tapped off, although the furnace was changed to the shape shown chiefly to avoid the shoulder or bosh upon which the slag tended to collect. The scouring action of the contents of the cupola as it settles bodily upon tapping out the melted metal, is evidently promoted by straight walls. The working of the cupola in its present shape, excepting the wearing of the walls just above the tuyeres, is quite satisfactory, and if a change of shape will prevent this wearing without promoting other difficulties, or if the lining can be made to resist the action of the heat and slag by water-jacketing or otherwise, the cupola can doubtless be run like a blast-furnace for an indefinite time.

The particulars of working vary somewhat with the fuel. Coke requires less blast, and is, on the whole, the more manageable fuel, although hard anthracite is now used with great facility. The charges with anthracite average as follows: Bed of coal 5400 lb., pig 7500 lb., limestone 100 lb., coal 650 lb., iron 7500 lb., limestone 100 lb., coal 650 lb., and so on. The charges with coke and anthracite mixed average about as follows: Bed of coke 2500 to 3000 lb., iron charges same as above, and intermediate fuel charges 350 to 450 anthracite and 300 coke mixed. Coke being more bulky than anthracite, a less weight of it is required to fill the hearth; this must, of course, be full to a point above the tuyeres. The first iron charge on this light bed is often reduced to 2500 or 3000 lb.; sometimes the iron charges are all made about a ton each, and the intermediate coal charges are reduced in proportion. Such thin layers of fuel, however, do not seem to have body enough to burn quickly, or with the highest economy. The proportion of coal to iron melted varies, with the character of fuel and other circumstances, from 1 coal and 7 iron up to 1 coal and 10 iron.

The cupola largely used in Bessemer works abroad, is shown by Figs. 4, 5, and 6. This particular form is known as Ireland's. The general internal shape shown, either with or without the two banks of tuyeres, is also largely used without Ireland's special arrangement of tuyeres and annular wind-box. There is a difference of expert opinion in England, as to the utility of the upper tuyeres and of the extremely projecting boshes. The whole system of working, however, is so dissimilar to ours, that no close comparisons can be made. We weigh out charges of melted iron for the converter, by means of a large ladle standing on a scale in front of the cupola; we can thus melt continuously. As foreign works have no such weighing apparatus, they are obliged to melt a single converter-charge at a time, and since the cupola hearth must hold it all, and must be filled with coke to above the tuyeres, which is a larger amount of fuel than is really necessary to melt the single charge of iron, the furnace is wasteful. And as one charge must be fully melted before the next is put on, the working is slow. Two cupolas are constantly in use, one melting and the other getting ready. The time of melting a charge is from 1½ to 2 hours. The American cupola melts a charge in 35 to 45 minutes, and one cupola is used for at least 12 hours. The English cupola, however, runs in this continuous, or rather intermittent manner, for a week, without cooling down or internal repairs. By that time the boshes are nearly burned away and require extensive repairs or entire renewal.

The American system of construction and working is obviously a vast improvement over any other, and seems all that can be desired, except in one particular—the rapid reduction of the lining around and above the tuyeres. As before suggested, some increase of the boshes, or water-jacketing, or both, will doubtless be employed to remedy this one remaining defect.

Second. In the converting department, the most important American improvement has been in the means and method of rapidly renewing the tuyeres. The endurance of tuyeres, and of the refractory bottom in which they are imbedded, although very various under different conditions of material and treatment, may be set down as not exceeding ten heats. It frequently falls below five heats. In order, then, to make 30 heats per 24 hours, out of one pair of converters, it is necessary to put in and dry three and frequently four sets of tuyeres during the day. Although one set may last six or eight hours, yet in order to give time for occasional extra repairs of the lining, and to make sure of having one vessel always ready, it is found, practically, that when a plant is to be driven up to a large and consequently paying production, a new set of tuyeres must be made ready for use in two, or at most three hours after the last heat on the old bottom. And it is furthermore found—and this is of equal importance,—that the new bottom must be thoroughly dry and sound, so as to wear evenly, and to prevent the metal from breaking through.

The old method of replacing vessel bottoms was knocking out the stumps of the worn tuyeres, inserting new tuyeres, and making the bottom good around them in one of two ways.

1st. Pouring in semi fluid ganister and water, and leaving it to set as best it might. This mud bottom was soft and porous, and, unless fired for five or six hours, was very wet. It was, therefore, liable to rapid and irregular denudation, and to flaking off by the formation of steam.

2d. The other method of making the bottom good around the tuyeres, still practiced in many European works, is waiting till the vessel is so cool that a workman can enter it, and then ramming plastic ganister around the tuyeres from within, and firing the vessel until the whole mass is set. Unless the vessel is cooled by water (which injures the lining), some hours must elapse before it can be entered, and the bottom cannot be thoroughly dried in half a day.

The American works began with a much better system, viz., Mr. BESSEMER'S duplicate bottoms. The tuyeres, and the whole mass of ganister around them, were removed, and a new bottom, previously rammed and dried, was inserted. But still the difficulty remained of closing the annular space between the new bottom and the walls of the vessel. Pouring in semifluid ganister moistened and softened the bottom; waiting for the vessel to cool, so as to ram the annular space from within, consumed still more time.

Another of Mr. BESSEMER'S devices was then resorted to. The face of the new bottom, where it came next the walls of the vessel, was heavily luted with a paste of clay and ganister; the bottom was then pressed hard into place, so that this paste would be forced into all the interstices and so seal the joint.

After the most careful experimenting for several years, with flat joints and conical joints of every degree of taper, this method was abandoned in all the leading American works, as uncertain and unsafe. Generally, the luting would perfectly stop the opening between the bottom and the wall of the vessel, but sometimes an unsound place would be left, and the metal would break through it. The cost of a few disasters of this kind was enough to pay for reconstruction on a safe system.

The plan finally adopted, and now used almost without exception in America, and to some extent elsewhere, is shown by Fig. 7. The duplicate bottom is so constructed as to leave the annular space between it and the wall of the vessel open to the exterior of the vesssel, so that a workman standing outside can ram the annular space, and thus make a sound joint without saturating it with water, and while the interior of the vessel is still red hot.

The worn bottom being removed by a hydraulic lift or by any convenient means, the new one is inserted at once, and the annular space (*a*, Fig. 7; or F, Fig. 9.) is quickly rammed with plastic cakes of ganister, thus making the lining continuous and solid. Sometimes a part of the wall of the vessel comes away with the bottom, and sometimes part of the bottom sticks to the wall of the vessel. The annular space is thus left so irregular that merely luting the new bottom and pressing it up could not make a good joint; but when all these irregular cavities are seen and filled from the outside, the joint is always sound.

The earlier joints of this kind were made more nearly cylindrical. The angle shown, about 45°, has been adopted, 1st. To prevent pulling away the wall of the vessel; the comparatively flat joint will obviously part more easily, leaving a cleaner fracture. 2d. The flat joint is employed in order to save time by a partial application of the luting system just described. The face of the new bottom is smeared with plastic ganister and pressed into place; then the joint is rammed from without, and more ganister is inserted where it is needed.

The advantages of this system are obviously as follows:

1st. The new bottom is immediately set, without waiting for the vessel to cool. The entire operation has often been performed in less than an hour. When one vessel is being lined and the other is running alone, 24 heats per day are often made on three bottoms in the one vessel.

2d. The new bottom, having been previously baked, and not being saturated with water when it is inserted, is as sound and uniform as the materials used can make it. It therefore wears evenly and never blows up from the formation of steam.

3d. The material of the joint, being driven into all the interstices, and being comparatively dry, soon becomes as solid as any part of the wall. A joint rammed in this way has never been known to fail, as far as the author is aware; and the bursting of the metal, so frequent in the early practice, now never occurs for periods of many months, except from the occasional failure of a tuyere, and a tuyere may be easily and soundly replaced by a dummy, in these hard dry bottoms.

Third. A further improvement in converter bottoms consists in filling the spaces between and around the tuyeres with bricks, previously rammed up and dried, or with burnt silica bricks, or ordinary fire-bricks. A bottom thus con-

structed is shown by Figs. 9 and 10. There are three forms of brick, A, B, and C, Fig. 10. They are formed in split moulds, which are taken apart to release the brick. The spaces E are rammed with plastic ganister after the bricks and tuyeres are set. The sides of the bricks are ridged, to give a better hold to the material rammed into the joints.

The chief object of this construction is to save time in drying the bottoms, and hence to save in the number of duplicate bottoms required. It has been found that a large twelve-tuyere bottom, some five feet in diameter, and twenty inches thick, if wet enough to be soundly rammed, will not thoroughly dry, in an oven heated as highly as possible, without injuring the iron work of the cars, in less than four or five days. The rammed joints and spaces in the brick bottom, Fig. 10, will be thoroughly dried, in the same oven, in twelve to fifteen hours. Thus, half a dozen bottoms will keep two vessels going. The bricks are rammed up in any convenient place (not necessarily in the converting works), by common labor, and may be dried in quantity in a large oven.

Another advantage of the brick bottom is, that there is no danger of its "blowing up" from not being thoroughly dry. There is always a risk of getting rammed bottoms in wet; but a wet joint in a brick bottom will not blow up and flake off the whole bottom. Fire-bricks or burned bricks will outlast several sets of tuyeres, and although they are expensive at the start, they seem likely to save in the end, and are coming into use.

The details of vessel construction are both cheapened and improved, in the latter plants, as compared with the earlier forms, as shown by Figs. 7. and 8. The English vessel, Fig. 8, has a wrought iron trunnion-band, and wrought-iron trunnions bored out and slotted for the passage of air. The joints in the air-pipe leading from the trunnion to the tuyere-box, are in a confined space between the vessel and the pillow-block, and the pipe itself is flattened. In the American vessel, Fig. 7, the trunnion and its air-passage, and the top part of the air-pipe, are all *cast* together with the middle section of the vessel, and to make the latter strong enough, it is lined with three-fourth inch plate. The trunnions are made abundantly strong simply by being made large. The air-pipe joints, instead of being flattened and difficult to get at, behind the pillow-block, are moved to one side, where there is plenty of room.

Fourth. In the general arrangement of American works lies much of their capacity of rapid production. The most conspicuous feature is the arrangement of the vessels, especially their height above the general floor, and the consequent shallowness of the casting-pit. The English vessel-centers (excepting only in the latest plants) stand but three or four feet above the general floor, and the bottom of the casting-pit must hence be eight or nine feet below it. In this confined, unventilated, and comparatively inaccessible gulf, the largest and the hottest manual work is performed. Here the steel is poured, and the red-hot ingots and moulds are handled. In the American plant, the vessel-centers are nine feet above the general floor, and the pit is but thirty inches deep—just deep enough for convenient casting. All the operations of casting are performed, all the ingots and moulds are handled, by men standing on the general working floor of the building. Convenient access, free ventilation, and a short lift of moulds and ingots are thus secured. The high vessel also allows the removal of the vessel-bottoms on the general floor; and there is a second story of working room, by means of the platforms around the vessels, at the level of their centers. The runners are accessible for repairs, and the vessel noses for the insertion of scrap, from this platform.

The American fashion of placing the vessels side by side is not new. BESSEMER did it in his early practice, but not in such a way as to realize the advantages we are considering. In the American plant, the rear of the vessels is open to the floor in the cupola building, from which they may be conveniently fired, and where the tuyere-boxes may be opened, the tuyeres repaired, and the vessel bottoms set. The converting-house floor under the cranes is thus clear for ladle repairs—12 to 15 casting ladles are required—for storing ingot-moulds, and for other purposes requiring crane power. The vessel chimneys, standing in the wall of the building, occupy no useful space; whereas in the English plant the vessel repairs and the vessel-chimneys take up valuable room under the cranes, and the chimneys prevent the cranes from revolving through an entire circle.

In the American plant the diameter of the pit is also increased, to allow several sets of ingot-moulds to be put in at once, and the available pit-room is also enlarged by placing the vessels at one side of it, rather than on opposite sides.

Instead of two ingot cranes, three are placed over the pit, two of which command the vessels. For handling a hundred and fifty tons of ingots and double this weight of moulds twice over every day, besides the mould bottoms and ladles, this additional crane capacity is indispensable.

The vessel-bottoms are removed and replaced by means of a hydraulic lift and a car under each vessel. The exterior trunnion of the vessel is supported by a beam instead of a pier, so that the vessel-bottom or a whole section of the vessel can be removed laterally for repairs, after it has been let down upon the car by the lift. Both inner trunnions are supported on an iron or masonry pier.

Fifth. Bottom-casting, or casting ingots in groups, that is to say, pouring the steel into a central sprue, and allowing it to enter the bottom of a number of moulds at a time, through a fire-clay distributor, has been the subject of much experimenting and many improvements in this country. The stream of steel, instead of falling from the top to the bottom of the mould, and spattering against its sides, thus causing a cellular texture and incipient cracks, rises slowly and quietly from the bottom. The ingots are more smooth and sound, and the endurance of the moulds is doubled.

Various improvements have been instituted in the general design and details of hydraulic and blowing machinery which we have not time to consider at present.

To recapitulate, the large production of American works, as far as it depends on engineering arrangements and constructions, is due chiefly, 1st, to improved cupola furnaces and method of working; 2d, to the means described for quickly and soundly renewing the vessel-bottoms and the use of intertuyere bricks; 3d, to more roomy and convenient arrangement and distribution of the working parts and spaces; 4th, to filling the ingot-moulds from the bottom by improved and convenient apparatus.

The Causes of Accidents in Coal Mines, and the Means of their Prevention.

OPINIONS OF THE ENGLISH INSPECTORS OF MINES.

CONTINUED FROM PAGE 102.

All renewal or replacing of props and other necessary repairs in the waste and road-heads shall be done by the employers, through their roadsmen, brushers, or firemen; in cases of winning out working places where fallen, nothing contained in these rules shall prevent the miners from being remunerated at the rate of shift wages, or what they earn when working under ordinary circumstances.' Similar negotiations between owners' and workmen's delegates were carried on in Lanarkshire, and various alterations of the rules agreed to. The owners submitted the new code to the Secretary of State, who approved of them and they are now established. Those referring to propping being as under:—'Whether the operations shall be conducted by the 'long-wall' or 'stoop-and-room' system, a sufficient number of suitable props being supplied at their working places the same shall be set by the miners in their working places where the roof and sides require to be secured by them, in terms of General Rule 16. These props and any necessary spraggs or gibs shall be set up at such times, in such number, and at such points, within the working limits, as shall from time to time be necessary. But, besides being bound to prop and secure according to their own skill and experience, miners are required to place props within their working places in such manner as the fireman or other person authorized to that effect, shall deem necessary and shall direct, for the safety of the workmen and the mine. When employed to return upon and remove stoops left in any seam, miners shall be bound to prop and secure the roof and strata around each stoop before commencing to cut or remove the same, and such places shall be deemed 'working-places' under these rules.' The rule for supervision on the part of the owner being in both cases as before, viz.:—'It shall be his (the fireman's) duty to see that the miners are attending to the security of the roof and sides of the working places, and for that purpose to visit each working place at least three times each day at proper intervals; and in case of finding that any miner is failing so to secure his working place, by propping the same or otherwise, to point out to such miner any such failure; and should such miner refuse or fail to perform such repairs as may be necessary to render the place secure, to require him and his assistants to remove from such working place.

Explosions of Gas and Powder.

MR. WARDELL.—"Ventilation should consist of an active volume of air passing into every working place so as to afford every workman air purified from all noxious gases. The air current, too, requires splitting; brattice, according to the rules, is to be regularly used in all places which have but one intake for air. The return air should not be allowed to pass directly over the flames of the furnace. Every working place should be examined with a safety lamp every morning, and this examination should be regular and general, as accidents have too often occurred through a cursory and partial so-called examination. These and other matters all conduce to the safe working of a mine, and, indeed, if the regulations and special rules under the new Act be faithfully carried out, they will all be found to be embraced therein. I have to make my oft-repeated statement, that to use together safety-lamps and naked lights is a most dangerous and much-to-be denounced system. More than one of the accidents I have had to record in this report may trace their origin to this anomaly. I am most decidedly of opinion that in the fiery seams in this district, which are unfortunately liable to terrible outbursts of gas, safety-lamps exclusively should be used. I believe, myself, from experiments, and as the result of experience, that the Stephenson lamp is, in the hands of the miner, the best lamp he can have; it has been fairly tested in this district, and has always proved a safe lamp. I have also observed before, I think, that one of the best means of locking a lamp is by means of the lead rivet, and at some of the largest collieries here, where this means is adopted, every day corroborates this statement. Where, under the old system, unlocked lamps and lamps tampered with were of frequent ocurrence such a thing now is seldom or never met with. As regards blasting, I would that legislation had gone further, and prohibited it in these fiery seams where safety-lamps are used. Altogether, however, I hope much from the section which insists on cartridges being used and shots being fired by properly authorized persons during three months after any gas has been *found*. The stoppage from further use, too, of all iron prickers and stemmers is much calculated to prevent accident, though their discontinuance had always been recommended by me previously to the enactment."

MR. ALEXANDER: "I take this opportunity to impress upon colliery managers the necessity of cautioning their officials and workmen against tampering with shots in any way beyond the regular manipulation, and the great danger which is run by returning too early to a shot which has missed fire. Great care should be taken in charging and stemming shots, where naked lights are in use, and the powder is introduced loose. As a large proportion of the coal in this district is very hard, and so requires the use of much powder in working it, this subject calls for the particular attention of the managers. The mastery of the whole question of boiler engineering requiring as it does such a thorough practical, as well as scientific, knowledge of the subject, I think it would be conducive to the safety of both life and property if all boilers were insured by some respectable company, who by the attention they pay to the condition of the boilers they insure, (by means of periodical inspections by competent judges, who refuse to allow a boiler to work in an unsafe condition), tend greatly to lessen the risk of explosion. This ought not in any way to decrease the attention paid by the colliery engineers to their boilers; nor do I think it would have that effect, but rather the reverse. I would also warn colliery owners and managers against the use of very old boilers, as when a boiler is past a certain age it is, as a rule, untrustworthy, I consider it an important feature in the new Act, that it renders it compulsory to report all accidents to any person employed, arising from explosions of gas, powder and boilers, and all serious accidents arising from any cause whatever. The investigation of these accidents has frequently led to recommendations being made, and precautions used against their recurrence, and thus in all probability prevented some fatal accidents. In connection with accidents caused by persons falling down shafts, I have to remark that gates should be provided both at the top and bottom of working or pumping shafts, for their prevention, as required by the 14th General Rule. Wherever it is possible these gates should be permanently on, and be worked by the cages, and not have to be removed while the pit is at work, for perhaps it is then that they are of the greatest use."

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RICHARD P. ROTHWELL, C. E., M. E., } Editors.

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The Papers Read Before the American Institute of Mining Engineers.

IN the columns of the ENGINEERING AND MINING JOURNAL alone can be found all the papers read before the AM. INSTITUTE of Mining Engineers. The volume of "Transactions" contains but the most important papers, many of great value being necessarily omitted, the limited means of the Institute not permitting their publication. As every member of the Institute naturally desires to have a full record of what has been done, we would state that a few sets of the ENGINEERING AND MINING JOURNAL containing this can be furnished. Some of the early volumes are exceedingly difficult to procure, and those desiring them should make early application.

Meeting of the Institute of Mining Engineers.

THE prospect of a large and interesting meeting of the Institute at New Haven, on Tuesday next, is very gratifying, and, indeed, experience has shown that each and every meeting of this live and progressive Society is a success in every sense. That the interest in the Institute is fully maintained, is evident from the number and value of the papers already announced for this meeting, and from the fact that nearly fifty new applications for membership have already been made.

We urge upon all the members who can possibly attend to do so, and to come prepared with some note, however brief it may be, of their professional experience. They should constantly bear in mind that the every-day events of their professional life, things which may appear too commonplace to form the subject of a paper, are new and interesting to many of their fellow members, and may lead to discussions of great value to themselves.

The facility of access, and the beauty and other attractions of New Haven, will contribute to make this one of our largest meetings.

McAndrew.

WE have just received, in the usual official form, the Reports of the Pennsylvania Inspectors of Mines for 1873, and we purpose, on another occasion, reviewing them. They are generally plain, sensible and useful documents. At present, we shall confine our attention to MCANDREW'S wonderful treatise on "matter and thing" in general, a production so rich in subject for thought and admiration that we have had to pause, after the perusal of each sentence, to marvel at the eccentricities of genius, and to express amazement at the enlightened intelligence of the Pennsylvania legislators, who can add, year after year, such a volume to their official literature.

For the information of the many new readers of the Journal, and in justice to him and the district he honors, we beg to say that the MCANDREW (there cannot possibly be more than one such) is the distinguished "Clerk of the Schuylkill Mining District." This is no ordinary clerk, however, but an illustrious patriot and philanthropist, who, for the miserable pittance of $1500 per annum, dedicates, with (too) fruitful industry, his grand intellect and unrivaled attainments to the glory and honor of his District, his State, his Country ; to the entertainment and instruction of the whole civilized world. It is natural we should hesitate before criticising the work of such a man, and, indeed, he is invulnerable, as much above criticism as the grasp and brilliant erudition of his work is beyond ordinary comprehension. Fortunate Country, happy State, glorious District that is honored in the possession of this immortal clerk, this incomparable MCANDREW !

Some of our phlegmatic readers may think these expressions of admiration too strong, but they do not know the man. In former years we were so bold as to criticise his reports, and to intimate our disagreement with some of their statements ; but as, year after year, we have been favored with fresh proofs of the intellectual originality of this distinguished author, we have gradually subsided into wondering admiration, and this last volume has completely overcome us ; our richest language, though reinforced by the great "Unabridged," seems too poor to express our inmost feelings.

Our space would be far too limited were we to undertake to notice all the admirable statements, the original conceptions of this volume. We must, perforce, limit ourselves to culling a few gems from this great placer of "brilliants," and we present them in their untarnished setting, being careful to maintain, with scrupulous exactness, even the original punctuation and orthography, that nothing may be lost of their freshness.

We are told (p. 40) that in Schuylkill County "ventilation, as a permanent auxiliary to mining in deep coal mines is absolutely established. The steam suction fan system largely predominates over all other antiquated means used formerly, and is so far an improvement on the old Winin sheet, water fall blowing fan and furnace, as the locomotive is on the cart."

Among the causes of accidents in mines, the following is given, (p. 43) : "Many persons are subject to fits of giddiness after inordinate smoking or drinking, or may be out of composure by domestic cares and numerous uneasiness of mind which would affect them when under such circumstances. Amongst these evils we must class forgetfulness, and often men are subject to spells of this kind that they really forget everything and become confused, bordering on insanity." We will take MCANDREW'S word for it, he ought to know.

On the subject of the steam engine, (p. 55,) our author "only touches upon what is useful in its construction. * * * The first grand essential is the cylinder, which may be constructed of any form, but commonly in a longitudinal circle, with numerous attachments—pipes, nozzles, valves, &c." This lucid description of the "grand essential" of a steam engine is followed by an equally clear account of the "auxiliary" "pipes, nozzles and valves" that "receive their motion by different contrivances, such as eccentrics, levers, hand gear, &c."

One of the most brilliant triumphs of this grand intellect is to be found in the exquisitely simple manner in which the great problem of squaring the circle is solved (p. 58.) The characteristic modesty of great genius was never better exemplified than in the unpretentious manner in which this great discovery is stated, under the heading "How to ascertain the area of a valve." We have the most unqualified admiration for the simplicity and modesty of genius, and while recognizing these qualities in the distinguished Clerk of the Schuylkill District, for the good of mankind in general and for the glory of the great State that has immortalized its official literature by the publication of this discovery, we cannot but give the rules and examples in full :

"RULE :—Multiply the diameter by the diameter, which is called squaring the diameter, and the product is the circular area " ; [who but MCANDREW would ever have resolved into this elemental simplicity the great problem ?]" to obtain the square area we multiply by 7,854, and this will give the superficial square in inches ; consequently" [beautiful sequence] " the weight on the safety valve, in pounds avoirdupois, divided by the area in circular or square inches, is equal to the pressure in pounds upon each square inch of the steam boiler.

"RULE.—When the weight is placed upon the valve direct, thus : Area of valve multiply pressure per square inch, equal whole weight ; and also whole weight divide area of valve, equal pressure per square inch.

"EXAMPLE.—Diameter of valve equal 4 inches, loaded with 50 pounds to the square inch, what weight is there upon the valve ?

"Thus :—$4\times4=16\times.7854=12.5664\times50$ lbs.$=628.3200$ lbs. or 628 lbs. 5 oz.= whole weight upon the valve.

" Case 2 :—628.3200 lbs. being upon the valve what is the pressure in pounds per square inch ?

"Here :—$4^{c}\times.7854=12.5664 \div 628.3200=50$ lbs. per square inch."

This must be quite clear to every one.

Under the heading " Pumping Engine Work Considered," we find, p. 63, this original definition :

" *Observe.*—The student in mechanics must remember that a true mechanical square is 90 degrees, or a quadrant, and is, to all intents and purposes, a right angle ; consequently half this angle is 45 degrees ; all obtuse angles are greater than 45 degrees, and acute angles are smaller than that number."

" *Example* 2 (page 64).—How many horses power must an engine have to be able to pump 14,000 cubic feet of water per hour from a mine 300 feet deep ?

" *Rule.*—As the units of work done for one horse is to one hour, multiply the friction of the pump ; so is the work of the whole mine divide the value of one horse."

To the giant intellect of MCANDREW the solution of this may seem a simple matter, he don't appreciate the limited capacity of most minds, and how humiliating it is, after we have pondered fruitlessly over the problem, to be told in the next sentence " these examples are peculiarly adapted for the young student or

mechanic to enable him to calculate the requisite powers with safety." Doubtless this great instructor could set us problems that would indeed endanger our reason—how thoughtful, then, to give the young mechanic questions that may be solved with safety!

Under the title "Gases, their character, constitment, measure and weight," (page 65), we are told that "Carbonic oxide is the 'choke damp of the miner" and "Carbonous oxide is still another deleterious gas," and still further on "Atmospheric oxygen is diluted with four times its bulk of another gas (hydrogen), which, if taken alone, extinguishes fire altogether, but when combustion takes place the hydrogen is converted to watery vapor, and carbonic acid is set free."

This looks so like McANDREW that we had already given him credit for it, when on the next page (67) we found, "The subject upon those gases common to coal mines has been extracted from the works of modern authors, who have labored long and diligently for the enlightenment of humanity and to ameliorate their condition." Is it possible that there can be other McANDREWS? No, never, our patriotism forbids the thought!

McANDREW has a very remarkable Aneroid barometer, an instrument by which he can ascertain in a twinkling the percentage of fire damp contained in the air of any mine. The manner of testing the air is given in some detail (p. 71); briefly, it is as follows: The thermometer and barometer are read at the surface and again in the mine. "The temperature of the mine is many degrees higher than it was found outside. It determines the condition of the air to be warmer," etc. If the barometer stands at the same height or is lower inside than outside, we are told it is because "the air is diluted with fire damp gas which causes it to become rarified and lighter," etc. We commend to our chemists this simple method of analyzing the air of mines; they must, however, use a very sensitive barometer. "Each inch on it," we are told, "is graduated into 10,000 parts"!!

Want of space, not lack of material, must here limit this notice. We close it with the proud conviction of having, though imperfectly, done our duty in handing down to the admiration of future ages a man and a book that for all time to come will be pointed at as grand illustrations of the appreciation by our public men of genius and learning, and as monuments to the "Eternal fitness of things" which we enjoy in the untramelled liberty of our glorious Republic.

To his Honor CYRUS L. PERSHING, President Judge of the Courts of Schuylkill County, whom (seriously) we believe to be an honorable judge and accomplished gentleman, is the country indebted for this honor bringing appointment. We trust that our admiration for true worth will prove contagious, and that some higher and more worthy position will be found for the man whom the whole country must delight to elevate. With an intense earnestness that should bring its reward we appeal to the great State of Pennsylvania, to Congress, to his Excellency the President, is there not some higher position that would be graced by so much ability? Have we not, if we may be allowed modestly to suggest our preference, have we not some "foreign mission" in which McANDREW might add to the lustre which our representatives abroad have so nobly shed upon our free institutions?—or, should the characteristic modesty of the man refuse so conspicuous a reward,—we believe, and we doubt not our readers agree with us, the marvelous acuteness with which McANDREW comprehends the mental capacity of "the Senate and House of Representatives of the Commonwealth of Pennsylvania," to which his report is addressed, would make his appointment to some position in one of our insane asylums a subject of congratulation in which we could heartily join his other admirers.

CORRESPONDENCE.

Cornish Mine Captains.

NEW YORK, February 17, 1875.

TO THE EDITOR: SIR—My attention was attracted this morning by a letter in the ENGINEERING AND MINING JOURNAL of February 13th, dated from Black Hawk, in Colorado, which contains some "complimentary" remarks in relation to myself, and asks for information regarding the meaning of the term "Captain of a Shaft."

The term is used to designate an under-superintendent in some of the large mines at Lake Superior. The Mining Captain has charge of all the underground workings, while the Shaft Captain is subordinate to him, his territory being indicated by some particular shaft opening. As used in my letter of the 12th ult., it referred to an under-superintendent of miners, the knowledge *requisite* for which position is confined to practical experience as a miner—simply to sink shafts, drive levels, timber, stope, remove ore, etc., as directed by the Mining Captain, who is responsible for the work.

Whether the term itself is used in Cornwall or not is a matter of no consequence; it is explanatory of itself. For the edification of your correspondent in Black Hawk, I refer him to URE's Dictionary, vol. 3, p. 560. "Shaft—in mining signifies a perpendicular or slightly inclined opening." WEBSTER says: "Captain—a head or chief officer."

The gentleman from Black Hawk takes exceptions to the sweeping "criticisms made by Dr. MELLISS on Cornish Mining Captains." Except to praise them, I have made *no* criticisms on Cornish Mining Captains. I did criticise the conduct of some men who assume the *title* of "Cornish Mining Captain," falsely representing that they possessed that distinction at home.

My remarks were intended to apply only to those Cornishmen who assumed a position in the United States which they would in nowise be entitled to assume at home in Cornwall.

The writer of the Black Hawk letter declares himself to be a Cornishman, and adds: "Cornishmen, as a rule, do not make great pretensions to high scientific attainments; they rarely add to their business of mining the professions of Consulting and Analytical Chemist, etc., etc."

In so far as these remarks may apply to your Black Hawk correspondent, I do not presume to dispute them. If a mining engineer is not posted on geology, chemistry, mineralogy, and the kindred sciences as well as those of a mathematical nature, he will labor under insuperable difficulties, and, in fact, will *not* be a mining engineer.

I beg to state that I have enjoyed the acquaintanceship of several eminent Cornish Mining Captains, or Engineers, and they were gentlemen who were thoroughly well read in the sciences mentioned, every one of which came constantly into play in the course of their professional duties.

In closing, I wish to remind your Black Hawk correspondent of a French proverb, which says: "*Qui s'excuse, s'accuse.*" Very faithfully,

D. ERNEST MELLISS, 52 Broadway.

NEW PUBLICATIONS.

Method for the Computation from Diagrams of Preliminary and Final Estimates of Railway Earthwork. By ARTHUR M. WELLINGTON, C.E. New York, 1875. D. APPLETON & Co. Part I. Text 12mo., pp. xvi, 163. Part II., Plates, folio, 12 plates.

The work before us is an application of new methods of solution to old formulas for determining solidities. The novelty consists in using diagrams instead of tables, so that this may be called the graphical representation of solidities. The general principle on which these diagrams are constructed is exceedingly simple, and we will endeavor to state it briefly, although it is somewhat difficult to explain it fully without the aid of figures. The common method employed in making estimates of earthworks is that of "end-areas," in which it is assumed that the contents of the excavation is equal to the solidity of a prism whose base is a mean between the two end sections. Wherever great accuracy is required, either the prismoidal formula should be used, or a correction should be applied, derived from this formula. The end area may be a level cutting, a three-level section, or irregular. In general, it will be sufficiently accurate to take a three-level section. Now, knowing the width of the roadway and the slope, it is easy to find a formula for the area of such a section, which being multiplied by a proper constant will give the solidity of a prism having this section for a base, and any required length. The general formula will then have three variables, viz., the solidity of the prism, the distance between slope-stakes, and the center height of the end section, so that a diagram can be constructed from the formula, supposing the center height to take successive equal increments, giving the solidity of a prism for any three-level end section. In the diagram, the solidities are given for prisms 50 feet in length, so that it is only necessary to add together the solidities given for the two end sections to obtain the whole solidity between two stations. These diagrams are for roadways of 14, 15, 18 and 20 feet, slopes of 1½ to 1, 1¼ to 1, and 1 to 1, end sections up to 116 feet between slope-stakes, and a center height of 30 feet. The solidities are given directly by intersecting lines for every 10 cubic yards, intermediate quantities being estimated by the eye. The distance between slope-stakes is laid off at intervals representing 0·2 of a foot, and the lines for center height are at a similar distance from each other. These diagrams also contain lines for determining solidities from level sections, when either the width or top, or the center height is given—and by the aid of these diagrams it is easy to reduce any section to an equivalent level one. It will be seen from the above description, that these diagrams furnish in a comparatively small space data that would be entirely too bulky to be tabulated. We have made use of the diagrams in solving a few examples, and find that their application is exceedingly simple, though it will probably require considerable practice to enable any one to work as rapidly as with tables. It would seem, however, that the range of these diagrams, in comparison with tables, will render computation generally easier and more rapid.

For the determination of end areas of any form, it is convenient to separate them into trapezoids and triangles, or into triangles alone, and a table for triangular prisms will facilitate the computations.

This is probably the most useful diagram in the collection. The other diagrams refer to prismoidal corrections, side-hill cross-sections, preliminary estimates, and computations from HENCK's formula, the latter being, we believe, about the first practical application that has been made of HENCK's rule. The author is entitled to great credit for having adapted these tables for use with the ordinary field notes, so that an engineer can readily accustom himself to their application. A table of reference, preceding the diagrams, tells what each line in the diagram represents, and refers to the pages of the text on which rules for using the diagram can be found. The text contains a clear exposition of the methods used by engineers in measuring various forms of earthwork, and forms an unusually valuable treatise on the subject. There are numerous examples to illustrate the use of the diagrams, and the method of forming these is fully explained, so that it will be easy for any one to extend their use to other cases. Rules are given for adapting the diagram to conditions differing from those for which they were constructed, such as excavations with wider roadways, greater center heights, or different slopes. We think this work may well find a place in our technical schools, as well as in the working engineer's outfit.

Mineral Wealth of Central Asia.

By D. KER, in the *Geographical Magazine.*

IT is probable that Peter the Great, in his persevering efforts to obtain a hold upon the regions beyond the Caspian (as a set-off against his expulsion from the Azoff and Black seas by the fatal treaty of the Pruth), was actuated quite as much by the golden legends of the Asiatics respecting their fabulous abundance of precious metal, as by any hope of opening a new highway for the commerce of Russia. The instructions given by him to the exploring expedition of FLORIO BENEVENTI and NICCOLO MINERA (1721—1725), specify as its two main objects :— 1. To ascertain the feasibility of diverting the Oxus into the Caspian. 2. To estimate as exactly as possible the mineral wealth of Central Asia. Accordingly, we find BENEVENTI sending his imperial master "a handful of sand mixed with gold-dust, gathered in the Lower Oxus ;" and MINERA (who penetrated as far as Balkh) filling his despatches with a crowd of half-true, half-mythical details ; how the mountaineers of Badakhshan "sink large fleeces of wool in the sand of their rivers, and after a while dig them up covered with gold dust ;" how "there are mighty treasures of gold, silver, and musk in the cities of Kaskar (Kashgar), Dizan, and Margilian ;" how the river that flows past Samarcand "is called Zer-Affshan (gold-giving), because of its bringing down much gold from the eastern hills ;" with much more to the same purpose. These beliefs long survived their originators, and were greatly strengthened by the amazing influx of precious metals into Orenburg and Troitsk between 1748 and 1755, following upon the plunder of the ancient treasuries by Nadir Shah.

It was reserved for the present generation to dispel these visions, by showing, through clear and minute investigation, what Central Asia possesses and what it does not. Immediately upon the fall of Tashkend, in June, 1865, which finally established Russia's supremacy in Turkistan, the local Government began to fit out the expeditions which, in the two following years, surveyed the basin of the Syr-Daria, and the adjacent kingdoms of Bokhara and Kokan. These surveys established the richness of Eastern Turkistan in coal, iron, lead, copper, naphtha, saltpetre, and rock-salt, as well as the presence of gold in various spots ; while the statements of Russian as well as native travellers agree in asserting an almost fabulous abundance of these and other minerals in the spurs of the Thian-Shan mountains (which divide Asiatic Russia from China) and the still unannexed hills of Badakhshan.

Coal.—Taking the coal first, as the most important item in a region where the fruit-trees have frequently been cut down for fuel, we find, in Eastern Turkistan alone, five fields already opened for working, viz., two in the Kara-Tau range, which runs parallel with the Syr-Daria from Djulek to the town of Turkistan ; one on the Tchirtchik, forty miles northeast of Tashkend ; one in the hills to the south of Khodjent, the easternmost of the Russian cities on the Syr-Daria, and one (the largest) on the Naryn, or Upper Syr-Daria, in the Khanate of Kokan. Of this last I received a full written description and map, during my stay at Tashkend last autumn, from one of its proprietors, M. MIKHAIL FEODOROFF, who accompanied Colonel SCHAUFUSS's expedition into Kokan in 1867. After detailing his discoveries of naphtha, lead, copper, iron, etc., he proceeds as follows :— "The coalfields begin from the very bank of the Naryn, and cover a superficies of ninety-six miles, distant forty miles from the Kokanese town of Namangan, eighty from Kokan itself, and 200 from Tashkend. . . . Our shafts have laid open four beds, one above another ; the first 1¼ arsheen (2 feet 11 inches), the second 1½, the third 2, and the fourth 3 arsheens. All around them lie rich veins of lead, iron, and copper. . . . The coal might easily be floated down to Tchinaz on rafts, and carried thence by land to Tashkend (forty-three miles). The right of working has been fully conceded by the Khan of Kokan." M. FEODOROFF told me, in the course of conversation, that the private coalfields are not thriving at present, and that both he and the other proprietors would willingly dispose of them, but doubted whether any foreign company would be allowed to exist in Turkistan, whence all foreigners are so jealously excluded.

With regard to the other fields, the coal obtained from them is satisfactory both in quantity and quality. The chief obstacles are : 1. The extreme difficulty of transport in this roadless region ; 2. The aversion of the native population to coal fuel—which last, however, is not unnatural, their stoves and ovens being (as I have had occasion to notice when travelling among them) adapted solely for wood. Still, despite these hindrances, much has already been done. The long talked-of introduction of coal into the Aral flotilla of six steamers was carried out in 1868, 40,000 poods being served out at once ; and as early as the end of 1869, coal was selling both in Tashkend and Khodjent at 20 kopecks (6½d.) per pood—the pood being 36 lb. English. For the present, however, the hopes of the Turkistan coal proprietors appear to center chiefly in the establishment of regular steam navigation upon the Syr-Daria and Oxus, as well as upon the Orenburg-Samarcand Railway ; but it is clear that, with these new fields superadded to the 16,000 square miles of splendid anthracite on the Lower Don, the 15,000,000,000 poods of the "Moscow basin," the coalbeds of Lithuania, Kiev, and the Caucasus, Russia may yet become a great source of supply, as soon as her communications shall be completed.

Petroleum.—Naphtha seems to be tolerably abundant along the Upper Syr-Daria. M. FEODOROFF's report mentions several fine sources on the Mai-Boolak River, about twelve miles from the Naryn coalfield above described. According to him, the working of these springs dates back to a very early period. "In the course of one of our borings," says he, "we came upon traces of an old well, and had no sooner cleared away the rubbish which blocked it, than the naphtha spouted into the air like a fountain, rising in such abundance that we took out in that one day 400 buckets. The well was of considerable depth, the sides being strengthened with facings of stone and timber in alternate layers. Among the *débris* we found a broken earthen vessel of large size, which had evidently been used for drawing up the naphtha ; and from this and other traces we conjectured that this well must belong to a remote period, and had probably borne a part in the religious rites of the fire worshippers who in former ages inhabited this part of Central Asia."

Kerosene and asphalte have been discovered in large quantities in the neighborhood of M. FEODOROFF'S coal-fields, on the Naryn, near Namangan. The market price of kerosene at Tashkend in 1871-2 was 20 kopecks (6½d.) per lb. Asphalte is now beginning to be much used for plastering roofs, to make them proof against rain, the cost of this being 3 roubles (9s) the square *sajen* (7 feet).

Rock Salt.—Rock salt is found in numerous spots, but little worked as yet. One of the richest deposits lies about three miles from the village of Samgar, on the frontier of Kokan, eastward from Khodjent, the stratum being of considerable superficies, and 2 arsheens (4 feet 8 inches) thick. In 1872 the market price at Tashkend was four roubles (twelve shillings) per pood of best salt, and thirty kopecks (ten pence) ordinary quality. Of late, however, the markets have been shaken a good deal by the competition of the new quality found in the hills around Samarcand (quoted at fifty kopecks per pood) which is distinguished by a pinky color and a very agreeable taste.

Lead.—The richest veins of lead are those in the Toorlan ridge (Kara-Tau Hills) between the town of Turkistan and the village of Tchulak-Kurgan. This field (worked by the Kirghiz for a considerable period before the Russian conquest) is now the property of M. PERVOOSHIN of Tashkend, one of the richest and most enterprising merchants in Central Asia. The proportion of lead is 51 7-10ths per cent., with a slight admixture of silver. Since 1869 (the date of the contract between M. PERVOOSHIN and the Artillery Department for the supply of lead to the army of Turkistan) the price of lead has fallen from eight to three roubles per pood. The Khodjakent lead mines, near Tashkend, yield 23 per cent.

Saltpetre.—Saltpetre abounds in Eastern Turkistan, especially in the hills beyond Karshi (Moore's "Neksheb"), a large town ninety-one miles south-east of Bokh Here the late Emir had a large powder factory, the powder of which was sold in Bokhara for 15 kopecks (5d) for 1¼ lb. Other factories existed in Kokan likewise. The best saltpetre, however, is procured from Guzar, in Northern Affghanistan, which is said to rival Demavend itself in this respect.

Iron.—Iron is found either mingled with, or in close proximity to, nearly all the principal coal-beds ; but the richest "finds" hitherto are in the Kara-Tau range, containing the Ken-Tass 61 1-7th per cent. of iron, the Kok-Ti river, 50-52 per cent., and the Ausgen River 30 per cent. In the province of Semiretchensk likewise (the northeasternmost corner of Russian-Turkistan, lying between Lake Balkhash and the Thian-Shan Mountains) there have been discovered two iron-fields in the neighborhood of Kopal, about a mile apart, yielding from 12 to 20 per cent.

Copper.—Copper is found in considerable abundance along the beds of the smaller rivers, and veins of it have been discovered about forty miles from Sergiopol, containing from 1 to 2½ lb. of copper per pood. Large quantities of copper were obtained by the Khivans, in the beginning of the present century, from the Sheikh-Djelli range (where gold also, according to tradition, formerly abounded), skirting the Oxus from Urgendj down to Bend ; but these works have been long since abandoned. Similar veins are believed to exist in the Balkan Hills, which run parallel with the southeast seaboard of the Caspian, but no accurate survey has yet been made.

Gold.—As for gold, the exaggerated reports of which first drew the Russians to Central Asia, it is the rarest of all metals in Eastern Turkistan, though still sufficiently abundant to feed the hope of important discoveries hereafter, when the great boundary-range shall have become better known. The precipitous gorge of the Tchirtchik, however, (which falls into the Syr-Daria, near Tashkend), has disappointed the expectations formed of it ; and in no part of the country does any organized system of mining exist. The earliest stages of Californian and Australian digger-life are here to be seen enacting themselves over again. When a Kirghiz or a Doungan wants a dinner, and sees no prospect of earning one, he simply betakes himself to the nearest likely spot, and there, by "pan-washing," or breaking the quartz with a hammer, picks up enough to keep him for a day or two. Russian agents, whose professional journeyings have taken them a good deal across the Chinese border, tell me that, on the other side of the Thian-Shan, gold sells considerably under the market price, and that it is no uncommon thing for a Chinese trader to contract for the entire amount of gold obtained by a gang of laborers in a whole summer's work, on condition of clothing and feeding them for a twelvemonth. In the present day, the golden legends which formerly grouped themselves around Kashgar, Yarkand and the valley of the Zer-Affshan, seem to be concentrated upon the little mountain triangle of Badakshan. I do not, indeed, place much reliance on the stories told of it by the Afghan and Bokhariote traders whom I met at Samarcand ; but enough has been ascertained respecting this Eastern El Dorado to make it certain that the falling-off of its once famous trade in rubies and lapis-lazuli is not in any way owing to the exhaustion of the supply, but simply to the difficulty of transport and the dangers of the caravan route.

Summing up, then, the results already arrived at, we find six great mineral storehouses in Central Asia—the Kara-Tau Hills, the main range of the Thian-Shan, the Samarcand Valley, the Balkan range along the Eastern Caspian, the

Khivan range of the Sheikh-Djelli, and Badakshan. The three first of these have been in the power of Russia for years, and her settlements on the eastern seaboard of the Caspian have made her virtual mistress of the fourth. The fifth has just been given into her hands by the conquest of Khiva; and all that now remains for her to do is to annex the sixth. "It must be admitted," says Captain KOSTÈNKO, in his admirable report upon Central Asia, "that hitherto our researches into the mineral wealth of Turkistan have been fruitful of hopes rather than results; but judging by what we have discovered during the last three years, and by the advantageous position of the various mineral strata in the immediate vicinity of beds of coal, we have a right to anticipate a bountiful harvest in the future."

The three great essentials of a new country are coal, iron and gunpowder; and Turkistan, as we have seen, is richly supplied with all three. The position of the principal mineral strata side by side with beds of coal is an immense advantage; nor are able and energetic directors wanting. What is wanted now is an adequate supply of laboring hands; and these the Russian Government can always command if it will. On my way up the Syr-Daria I saw caravan after caravan of Russian peasants plodding eastward, drafted from the Volga to the wild regions lying between Lake Balkhash and the Chinese border; and the same fiat which sent them thither can at any moment people the mines and factories of Turkistan with the artisans of Central Russia.

Explosives as Sources of Power.—In considering the motive power of the future, it is impossible not to reflect upon the possible utilization for this purpose of explosive agents, such as gunpowder, the picrates, etc. They all may be considered as magazines of immense power, incomparably greater than the power stored up in any of the ordinary combustibles, such as coal or petroleum. In this view of the case, the following extract of a paper by Mr. CHAMPION, an excellent authority upon the subject, becomes interesting:—"It is estimated that the explosive power of nitro-glycerine is equal to ten times that of gunpowder, and that half a kilogram (1·1 pounds) would lift from the ground and project a weight of 160,000 kilograms. The heat evolved in the reaction is about 1,282,000 calorics for each kilogram. This same kilogram of nitro-glicerine, exploding in a closed space having a volume of one liter, develops a theoretical pressure of 243,000 atmospheres, a temperature of 93,400 degrees, and a quantity of heat equal to 19,700,000 calories. One liter of nitro-glycerine weighs 1·6 kilograms. In exploding in a place completely filled with it, as happens in a blast hole in mining operations, or when operating under water, this substance develops a pressure of 470,000 atmospheres; a pressure eight to ten times that produced by the same volume of gunpowder. The heat thus developed being 38,000,000 calories, the mechanical labor produced, which is the equivalent of this, rises to the enormous number of more than sixteen thousand million kilogram-meters, a value five times that of the maximum value of gunpowder." "A kilogram of coal contains about 8,000 calorics," says the *Revue Industrielle*, "each caloric being equivalent, theoretically, to 120 kilogram-meters. Hence the maximum mechanical work of 1·6 kilograms of coal would be 5,476,000 kilogram-meters; a quantity 3,000 times less than is produced with the same weight of nitro-glycerine. 'Is not the imagination of the most enthusiastic inventor,' it continues, 'staggered in presence of these enormous numbers? What an answer, too, do these figures furnish to the pessimists who see in the exhaustion of our coal mines the extinction of the industries of the future. *In a single liter of nitro-glycerine there is stored up the enormous labor of 5,500 horse-power acting continuously for ten hours!*'"

COAL TRADE REVIEW.

Import Duty on Coal.

Anthracite free. *Bituminous*, per ton of 28 bushels, 80 lb. to the bushel, 75c., gold.

All *slack*, or *culm*, such as will pass through a half-inch screen, per ton of 28 bushels, 80 lb. per bushel, 40c., gold.

Not otherwise provided for, per ton, 40c. gold.

This is the only report published that gives full and accurate returns of the production of our Anthracite mines.

NEW YORK, Feb. 19, 1875.

Comparative Statement of the Production of Anthracite Coal for the week ending Feb. 13:

	1875.		1874.	
	Week.	Year.*	Week.	Year.*
Wyoming Region.				
D. and H. Canal Co	41,246	281,399	39,230	204,161
D. L. and W. RR. Co	33,395	226,456	39,248	254,831
Penn. Coal Co	18,046	140,592	19,527	123,553
L. V. RR. Co	24,825	131,710	17,118	106,210
P. and N. Y. RR. Co	..	..	1,684	5,179
C. Rit. of N. J	765	16,786	18,115	57,327
Penn. Canal	..	..	..	..
Lack. and B. RR	..	24,931	..	21,031
	118,277	821,874	134,922	772,292
Lehigh Region.				
L. V. RR. Co	2,882	78,064	41,162	314,690
C. RR. of N. J	..	..	5,402	64,239
D. H. and W. B. RR	649	1,735	1,194	9,916
	3,531	79,799	47,758	388,845
Schuylkill Region				
P. and R. R. RR. Co	14,780	75,527	71,605	271,908
Shamokin and Lykens Val.	11,074	46,950	9,398	51,344
	25,854	122,477	81,003	323,252
Sullivan Region.				
Sul. and Erie RR. Co	132	1,346	523	3,462
Total	147,794	1,025,496	264,206	1,487,851
Increase	..	..	..	..
Decrease	116,412	462,355	..	..

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

The following table does not give the entire production of our bituminous mines, but it is by far the fullest report published.

The Production of Bituminous Coal for the week ending Feb. 13, was as follows:

Tons of 2000 lb., except where otherwise designated.

	Week. Tons.	Year. Tons.
Cumberland Region, Md.		
Tons of 2240 lb	17,215	112,656
Barclay Region, Pa.		
Barclay R.R. tons of 2240 lb	4,786	35,925
Broad Top Region, Pa.		
Huntingdon & Broad Top R.R	3,403	16,428
East Broad Top	452	2,243
Clearfield, Region, Pa		
Snow Shoe	1,739	8,016
Tyrone and Clearfield	14,224	61,676
Allegheny Region, Pa.		
Pennsylvania R.R	3,454	18,341
Pittsburgh Region, Pa.		
West Penn. R.R	3,134	19,190
Southwest Penn. R.R	111	518
Penn. and Westmoreland gas coal, Pa. RR.	16,286	78,179
Pennsylvania R.R	4,045	26,217
Kanawha Region, W. Va.		
Chesapeake and Ohio R.R	2,545	12,142

The Production of Coke for the week ending Feb. 5.

Tons of 2000 lb.

	Week. Tons.	Year. Tons.
Tyrone and Clearfield	12	118
Alleghany Region	....	....
West Penn. R.R	729	5,654
Southwest Penn. R.R	7,956	44,077
Gas Coal, Penn. R.R	930	4,360
Pittsburgh Coal, Penn. R.R	732	7,380

The exports of coal from Baltimore this year amount to 5,864 tons, as compared with 13,399 tons in 1874. The exports for the week amounted to 63 tons.

The receipts at Buffalo by the L. S. & M. S. R. R. for the week were 1,969 tons.

	week.	year 1875.	year 1874.
The receipts of coal at Coal Port (Trenton)	..	..	..
" " " South Amboy	935	16,095	80,896
Shipments at Coal Port (Trenton)	..	..	..
" South Amboy	6,007	31,579	55,134

MESSRS. J. H. HIGSON & CO report the following shipments of coal from Great Britain to

	1873.	1874.
West Indies	333,269	325,877
North America	191,841	283,636
South America	916,155	1,033,002
Total	1,441,265	1,642,515

The above shows an increase of shipments in 1874 of 201,250 tons over 1873, or about 13 per cent.

Production of Bituminous Coal. 1874.

Tons of 2000 lb.	Prev'ly reported.	Dec.	12 mos.
Blossburgh Region	775,119	21,269	796,388
Barclay Region	319,715	17,357	337,072
McIntyre Coal Co	132,788	6,135	138,928
Broad-Top Region	208,600	16,693	225,293
Cumberland Region	2,308,617	102,278	2,410,895
Clearfield Region	643 725	59,445	703,170
Alleghany Region	192,815	15,279	208,094
Pittsburgh Region.			
West Penn. RR	183,288	10,720	194,008
Southwest Penn. RR	7,321	559	7,880
Gas Coal, Penn. RR	831,817	79,189	911,006
Pittsburgh Coal, Penn. RR	411,006	8,220	419,226
Saw Mill Run RR	79,536	8,096	87,632
Cleveland and Pittsburgh RR	273,205	18,516	291,721
Pittsburgh, Cincinnati and St. Louis RR	553,902	50,536	604,258
Erie and Pittsburgh RR	260,972	9,476	270,448
Pittsburgh, Fort Wayne and Chicago RR	182,410	12,263	194,673
Castle Shannon RR	114,771	21,457	136,228
A. V. & P. R.R	907	..	..
Pittsburgh and Connellsville RR	334,933	..	..
Monongahela Nav. Co	2,503,593	..	2,503,505
Keeling & Co	165,070	10,951	176,021
Wettengal & Gormley	13,339	..	13,339
J. W. Carlin & Co	3,817	..	..
St. Louis Region.			
St. L. A. & T. H. R. R. Belleville Branch	166,531	20,429	186,960
B. & S. L. R.R	97,230	12,499	109,727
Illinois and St. Louis	170,792	22,288	193,260
Indiana North and South RR	6,369	518	6,887
Evansville & Crawfordsville RR	17,103	2,492	19,595
Ohio & Mississippi RR	226,610	20,820	247,430
Sewanee Region.			
Tenn. Coal & R.R. Co	72,596	8,902	81,948
Kanawha Region.			
Chesapeake and Ohio RR	116,912	23,305	140,217
Warrior Region, Ala.			
South and North Alabama RR	22,424	3,359	25,783
Cahaba Region, Ala.			
South and North Alabama RR	5,367	1,830	7,197
S. R. & D. R.R	13,339	1,065	13,339
Chicago B. & Q. R.R	346,579	34,665	381,244
B. & M. R.; R.R	78,176	8,044	86,220
Union Pacific R.R. Co.'s mines	131,327	..	..
" " " other mines	81,174	..	..
Summit County R.R	17,412	..	..
Keokuk & Des Moines R. R	9,544	..	..
Denver & Rio Grande	18,874	2,936	21,810
Cairo & St. Louis	56,220	..	56,220
	12,155,755		

Receipts at Port Richmond, none; shipments, 1,500 tons; and balance on hand 95,500 tons.

Returns from Greenwich, Philadelphia.

	Bituminous	Gas Coals.
Receipts	1,342	1,001
Shipments	1,361	529
On hand	2,018	472

There is a strong demand for Anthracite coal, but none is moving, owing to a continuation of the ice blockade. We have reports from every quarter of very low stocks, and if the embargo is not removed, some towns will suffer from the want of fuel; for with the extreme cold weather which has continued almost without interruption for several weeks, the consumption of coal has been very great. The stocks at the shipping ports are very low in certain sizes, and we are reported a sale of 2500 tons of lump coal from South Amboy, for reshipment to the Lehigh, for furnace use. With a continuation of the strike for a few weeks more, and the opening of the various winter ports, we will begin the season's business with a market almost bare, especially in domestic sizes.

In regard to the programme for 1875 we are not prepared to say anything definite, and think the best policy will be to wait until the 23d inst., when a declaration of prices for March, with the more important features of the programme, will be made. Our reports, from sources that should be reliable, are so conflicting, that we are unable to ascertain the truth. We are informed by parties we consider reliable, that prices will be higher this year than last, and others, equally reliable, say there will be no advance.

From some quarters we learn that the discount on lots of 10,000 tons will be 2 per cent. (equal to 10 cents per ton on the average of last year's prices; 2½ per cent. on 50,000 tons (equal to 13 cents per ton on the average of last year's prices); and 3 per cent. on 100,000 tons and over (equal to 15¼ cents on the average of last year's prices). By others we are informed that this will likely be changed, as some later developments suggest a more liberal policy. No great weight should be given to any rumors that may be heard, for until all the points are settled, none will be, and it is certain that all the members of the Combination are not satisfied with the programme as it is now proposed.

If the discount allowed to parties buying, say 45,000 tons, is to be but about 10c. a ton, and no other commission is paid, but few middlemen will be able to continue in the business. Theoretically, to bring the producer and consumer in contact, is correct; but practically it is difficult of attainment, unless in a complete monopoly, and the anthracite trade has not yet arrived at that point.

Even for domestic purposes the demand has been greatly increased by "drumming," and it will be necessary to continue this if the demand is to be maintained or increased, as it should be. We are informed of bituminous coals offering at $5@$5 50 alongside, in this city, and these are generally preferred to anthracite, at the same cost, for steam purposes. Middlemen, finding the anthracite business unprofitable, will naturally turn their attention to the bituminous trade, and from their acquaintance and influence with buyers, will be able to divert a considerable portion of the anthracite trade. In fact, we know of some who are now making arrangements to introduce bituminous coal, where their trade was formerly almost entirely in anthracite. The policy of the Baltimore and Ohio and Pennsylvania Railroads in giving a profit to the miners, and fixing freights at the lowest possible point, will eventually result in a considerable increase of their business. Freight contracts for the season have been made to carry double-screened gas coals at figures which, while leaving fair profits to the producers, permit them to be sold, f. o. b. alongside, in this city, at $6 50 per ton, or but 25@30c. above the average price of anthracite stove coal during the past year. If any such favorable contracts are being made on gas coals,

there is no doubt but that corresponding reductions will be made for steam coals, which are much nearer markets. This would materially increase the consumption of bituminous coal, at the expense of anthracite, for manufacturing purposes.

Under date of the 15th inst., the Philadelphia and Reading Coal and Iron Company issued a circular, soliciting orders for the season. Upon its face it looks like a waste of paper and ink, for every buyer would anticipate what is offered him, excepting, perhaps, the offer in the last paragraph of the following, which is the substance of the whole circular:

"Monthly circulars will be issued on or about the 20th of each month, establishing prices for the succeeding month; and the policy of continuously advancing prices throughout the season will, under all circumstances, be maintained.

"Propositions may be made to the Company at any time before the 31st of March, 1875, for the purchase of a stated quantity of coal, to be taken in equal monthly proportions, at current monthly circular prices throughout the season, with the right to the purchaser to decline to take the proportion due in any month; such declination not to give him the right, however, in any succeeding month, to take an increased quantity in lieu of that so declined.

"Should any such proposition be accepted, in whole or in part, the applicant will be notified of such acceptance immediately after the 1st of April.

"Any purchaser desiring to secure a yearly allotment of Lehigh, Wilkes-Barre, Lackawanna or Scranton coal, may include all or either of such coals in his application to this Company with the same effect as if made directly to the Company mining the particular coal."

When the above is considered in connection with the Company's rules, it amounts to the fact that they will sell you all the coal you want, provided they have it to sell, and you are willing to pay their openly-quoted prices, whatever they may be.

The strike stands about as it has been for weeks. There are fears that as the stocks of coal become low, and the demand increases, the strike will become general throughout the anthracite region.

Freights for both anthracite and bituminous coals are quite nominal, all the shipping ports being blocked with ice, and but little coal moving.

There is nothing doing in Cumberland coal, and it is impossible to predict the action of the companies for the coming season.

The Consolidation Coal Company held its annual meeting for the election of President and Directors, and for the transaction of other business, at its office in this city, on the 17th inst. The total number of shares of stock of the Company is 102,500, the number voted on was 54,615, and, with but slight exception, for the ticket as elected. It is believed that there was a strong opposition element, which, finding that it was in the minority, did not vote. There was a very full representation of the stockholders. Messrs. FREDERICK SCHUCHARDT, LLOYD ASPINWALL, FREDERICK G. FOSTER, and WALTON W. EVANS were elected as Directors, in the place of WILLIAM H. ASPINWALL, deceased, WARREN DELANO, H. H. MOTT, and JAMES ROOSEVELT. With these exceptions, the management remains unchanged.

We are reported sales of Pennsylvania and Westmoreland gas coals in quantities aggregating, at least, 100,000 tons, at $6 50 per ton, f. o. b. alongside. We are also reported sales of Provincial coals, without particulars. The price of Pennsylvania and Westmoreland gas coals has been fixed at $6 10 at South Amboy, as compared with $7 last year. It is thought that this will be the lowest price these coals will reach during the season.

Our Montreal correspondent notes the awards of contracts by the Grand Trunk Railway for coal to be delivered at the International Bridge, as follows: Catfish Mine, 54,000 tons at about $3 75, United States currency, and the Cameron Mine, 10,000 tons at a few cents less. A contract was made with Cleveland parties to deliver by vessel, at Montreal, about 20,000 tons at $4.

Wholesale Prices of Anthracite Coal for Feb. f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
†Lackawanna and Scranton at Elizabethport & Hoboken	5 55	5 65	5 75	5 90	6 40	5 35
*Pittston at Weehawken	4 75	4 75	4 85	4 95	5 35	4 50
*Wilkesbarre at Port Johnston	5 55	5 65	5 75	5 90	6 40	5 35
Plymouth, R. A	....	....	5 75	5 90	6 50	5 35
Susque. Coal Co. at Amboy W.A.	5 55	5 65	5 75	5 90	6 50	5 35
Kingston at Hoboken	5 55	5 65	5 75	5 90	6 40	5 35
***Lehigh Coals.**						
Old Company at Port Johnston	6 50	....	6 45	6 45	6 60	5 65
Old Company's Room Run "	6 00	....	6 00	6 00	6 35	5 35
Sugar Loaf at "	6 00	....	6 45	6 45	6 60	5 65
Lehigh Coal Exchange "	6 35	....	6 30	6 30	6 45	5 50
Honey Brook at Elizabethport	6 35	....	6 30	6 30	6 45	5 50
Spring Mt. C. Co. at Hoboken	6 35	....	6 30	6 30	6 45	5 50
Beaver Meadow at South Amboy	6 35	....	6 30	6 30	6 45	5 50
Schuylkill Coals.*						
Schuylkill white ash	5 55	5 65	5 75	5 90	6 40	5 35
Schuylkill red ash	....	....	5 75	5 90	6 50	5 35
Shamokin white and red ash	....	....	....	5 90	6 40	5 35
M. Franklin	....	....	....	....	....	....
Lorberry	....	....	....	....	....	....
Lykens Valley	....	....	....	....	....	....

* Small or Pea coal is quoted by these Companies at $1 35 per ton less than Chestnut.

† f.o. b. in New York Harbor.

* This is the rate for Schuylkill coal deliverable on board vessels at North 9th street, Williamsburgh.

	Per ton.
Freight from Hoboken and Weehawken to New York	45c.
" " Elizabethport & Port Johnston to New York	45c.
" " South Amboy to New York	50c.

Wholesale Prices of Bituminous Coal.

The following prices are principally fixed for the season, except where otherwise indicated.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn, at Greenwich, Philadelphia	$....	$6 60
" " at S. Amboy	6 10	..
Red Bank Cannel Pa., at Phil	8 00	8 50
" " at S. Amboy	8 50	...
" Orrel, "	6 50	7 00
" " at Philadelphia	6 00	...
Youghiogheny, Waverly Co, at Baltimore	....	7 65
Despard, West Va., nominal "	5 60	7 40
Murphy Run, W. Va. at Baltimore, nom.	5 60	7 40
Fairmount, W. Va " nominal	5 60	7 40
Newburgh Orrel, Md. " "	5 50	7 40
Cannelton Cannel, W. Va., at Richmond	10 00	12 50
" Splint, " " nom.	5 25	7 50
Peytona Cannel, " " "	....	12 50
Sterling " Ohio "	....	12 00
Straitsville, " At Sandusky, O "	3 65	11 50

Foreign Gas Coals.

	Sterling.	Am. cur'cy.
Newcastle, at Newcastle-on-Tyne	12/@13/6	7 00@ 8 00
Liverpool House Orrel, at Liverpool	29/	13 00
Ince Hall Cannel "	52/	18 00
" Gas Cannel "	40/	15 00
Scotch Gas Cannel, at Glasgow, nominal	28/	9 50
	Gold.	
Block House, at Cow Bay, N.S	2 00	6 50
Caledonia, at Port Caledonia	1 75	5 70
Glace Bay, at Glace Bay	1 80	5 50
Lingan, at Lingan Bay	2 25	6 50
Sydney, International and Reserve mines, at Sydney	2 25	5 75
Pictou, Albion and Vale mines, at Pictou	2 50	6 50

Steam and House Coals.

Broad Top, at the mine, $1 25; at Port Richmond, Phil nominal	4 75@5 00	6 00@6 25
Cumberland, at Georgetown and Alexandria, Va., nominal	4 30@4 50	5 75@6 00
Cumberland at Baltimore nominal	4 60@4 75	6 25@6 50
Clearfield, " Derby," " Kitanning" and "Sterling," at the mines, $1 25; at Greenwich, Phil., nominal	4 75@5 00	5 50
James River, carbonite, at Richmond, Va	6 75	9 00
" bituminous, " nom.	4 00	6 25

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$6 00	$6 20	$5 40
Lackawanna Coal, del'd	7 60	7 85	7 10
*Wilkes-Barre, delivered	7 60	7 85	7 10
Lehigh & Locust Mountain, del'd	8 00	8 00	7 50
Schuylkill Red Ash del'd	8 25		

The cost of delivering Pittston coal ranges from 40 cents to $1 per ton, according to distance from the yard.

* Twenty-five cents less than the above rates are charged to manufacturers.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$23 00
Liverpool House Cannel " " "	25 00
American Cannel " " "	16 00
American Orrel " " "	$15 00@16 00
Straitsville Cannel " " "	15 00@16 00
Carbonite " " "	12 00
Cumberland " " "	9 00

Coal Trade of Philadelphia.

PHILADELPHIA, Feb. 11, 1875.

The stocks of the companies will still be sufficient for some weeks to supply the needs of the city for domestic purposes, but of small sizes for manufacturers or large sizes for iron works the amount is getting so reduced that a few days will see the end of them. In some of the towns on the line the supply for domestic purposes is nearly exhausted. The amount of coal which could be supplied from the Shamokin district would, in a great measure, relieve some of the immediate wants, but the supply of cars to the collieries at work is kept down by the road, and the coal, after it is loaded, is delayed in its delivery at the point of destination to such an extent that teams with oxen would accomplish that part of the transporter's duty much quicker.

Almost every one is unwilling to believe that the combined companies will attempt to reduce the wages on their roads and at the mines and in the meantime maintain or increase their charges for coal. These two things cannot be accomplished together, but anyone fully aware of the imperious necessities of these great borrowers of money will not doubt that it may be attempted. The same foolish statements of anthracite becoming scarce and a luxury are circulated, while but a few weeks ago one company announced publicly that they had an inexhaustible supply and are engaged in sinking shafts from each of which one hundred millions of tons are expected to be produced.

A series of resolutions were offered in the Legislature of this State, this week, with the view to have a committee appointed to investigate the right of the Reading Railroad Company to mine and sell coal through the Coal and Iron Company which they own entirely. The matter was referred to the Committee on Mining, and the news has just reached this city that the committee had decided to have the investigation made.

Baltimore, Md. Feb. 16, 1875.

Reported by our Special Correspondent.

WHOLESALE PRICES PER 2240 lb.

ANTHRACITE.

	By cargoes.	In cars.
Wilkes-Barre, " Lee," or " Diamond,"		
Lump, steamboat	$5 15	$5 60
Broken	5 50	5 75
Egg	5 87	6 15
Stove	6 07	6 35
Pittston and Plymouth.		
Lump and steamboat	....	5 50
Broken	....	5 70
Egg	....	6 05
Stove	....	6 25
"Boston," freeburning white ash	....	5 50
Egg	5 87	5 70
Stove	6 07	6 05
Shamokin, (red or white ash)	....	6 25
Egg	5 82	6 05
Stove	5 92	6 15
Lykens Valley, red ash, egg and stove	6 02	6 55

From wharf or yard, wholesale, 50@75c. additional. By retail, all kinds and sizes, per 2,240 lb, $7@8 25.

BITUMINOUS.

George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60	4 75
West Va. Gas Coal f. o. b. at Locust Point	5 50	....
Kanawha Cannel, coarse	13 00	....
Tyrone	7 25	....
Ritchie Mineral of West Virginia	1 00	....

Boston. Feb. 16, 1875.

Reported by our special correspondent.

The retail coal business here is very active; the out of town dealers are running short of all sizes. There is frequent inquiry for broken coal.

CARGO PRICES TO TRADE.

Lingan coal	$ 5 75	Westmoreland, and Penn.	7 75
Caledonia	5 00	Waverly Co. Youghiogh'y	7 75
Pictou	6 15	Cannelton Cannel	13 50
Block House	5 60	Cumberland	6 85@ 7 00
Red Bank Cannel	10 00	Anthracite	.6 50@ 7 25
Glace Bay	5 00	" Retail	.7 50@ 8 00
Sydney	7 00		

Buffalo, N. Y. Feb. 12, 1875.

Per ton of 2000 lb.

	Slack.	Nut & Slack.	Nut.	Lump
Connelsville coke				6 00
Sterling cannel				6 00
Red Bank				5 75
Youghiogheny coal for gas				5 50
Briar Hill coal		3 25		5 00
Fairmount "		3 25	3 60	4 00
Catfish "		3 25	3 60	4 00
Stoneboro "	2 75		3 75	

Briar Hill coal, and Stirling and Red Bank cannels retail at $7 50; all other coals $1 per ton above wholesale prices.

Anthracite f. o. b. vessel.

Grate	6 70	Stove	7 15
Egg	6 70	Chestnut	6 65

Retail prices delivered and screened, $1 per ton additional.

Chicago, Ill. Feb. 16, 1875.

Specially reported by Messrs. RENO & LITTLE, Coal Merchants.

No change in prices of coal. Weather very cold and the coal piles melting away. So mote it be.

Retail prices per ton of 2000 lb. delivered to buyer.

		BITUMINOUS.	
Lehigh Lump	$10 75	Briar Hill and Erie	7 50@ ....
Lehigh prepared and car load lots	10 25	Walnut Hill (W. Va.)	6 50@ ....
Lackawanna, Wilkes-Barre and Pittston,*		Midway (West Va.)	6 50@ ....
Grate, egg, and chestnut	9 50	Cannel	8 00@ 9 00
Stove or range	10 00	Blossburg	8 00
		Indiana Block	6 00
		Hocking " Brooks"	6 00
		Wilmington and Illinois	5 00

*75 cents off these prices for car load lots to country dealers and manufacturers.

Cleveland, O. Feb. 16, 1875.

Reported by our Special Correspondent.

Per ton of 2000 lb. on cars.

Youghiogheny, l'p	$4 40	Columbiana	$3 00
Youghiogheny, nut	3 40	Strip Vein	3 20
Briar Hill, according to quality	$3 85 to 4 00	Mountain Blossburg (blacksmith)	5 50
Massillon	3 65	American Cannel Coal Co.s Cannel	4 50
Hocking Valley	3 25		
Straitsville	3 25		
Anthracite, Lackawanna on cars,		Egg	$6 85
" " " "		Stove	7 50
" " " "		Chestnut	7 00
Youghiopheny Coke, " "		here	5 25
Connellsville " " " "			5 50

50 to 75 cents per ton additional for delivery at retail.

Cincinnati, O. Feb. 16, 1875.

Please quote the following as prices current here to-day, per load of 25 bushels, retail. Ice in river here so strong that it is impossible to move barges, so wholesale prices are not quoted.

Per ton of 2000 lb.

	Bush.	Ton.
Youghiogheny, or Pittsburgh, afloat	— c.	
Pomeroy coal	— c.	
Cannel coal	— c.	—
Semi Cannel	— c.	—

The following are retail prices delivered:

Youghiogheny	12@14 c.
Pomeroy	10 c.
Cannel	24 c.
Kanawha Semi Cannel	22 c.
Anthracite	$9 50@10 00
Foundry coke	10 c.
Soft coke	8 c.

Youghiogheny	2 75		

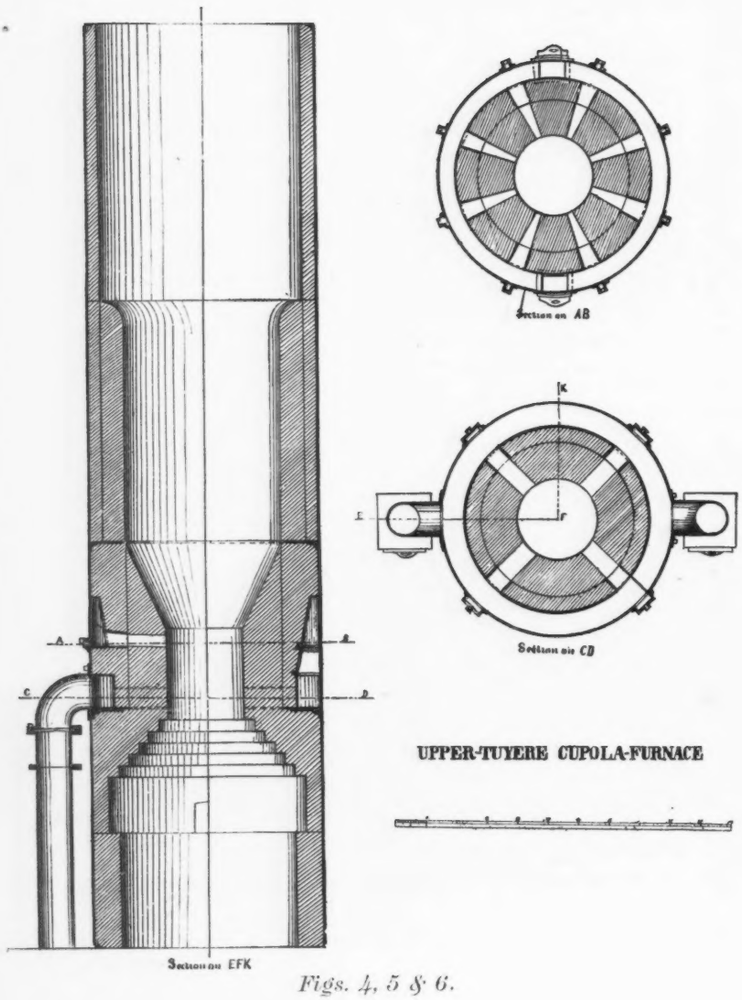
Detroit, Mich. Feb. 15, 1875.

Specially reported by Messrs. ROBINSON & KEYS, dealers in all kinds of coal.

Trade continues very good, and stocks are very low, some yards being entirely sold out of prepared anthracite, and depending on the railroad for supplies. Prices are firmer than at any time this winter, but unchanged.

Per ton of 2000 lb.

Lehigh Lump, per ton	$10 50	Blossburg	8 50
Lehigh " prep. sizes	10 00	Briar Hill	7 50
Wilkes-Barre, Grate and Egg	9 00	Willow Bank	7 00
Wilkes-Barre, Stove and Nut	9 50	Erie	7 50
		Massillon	7 00



Figs. 4, 5 & 6.

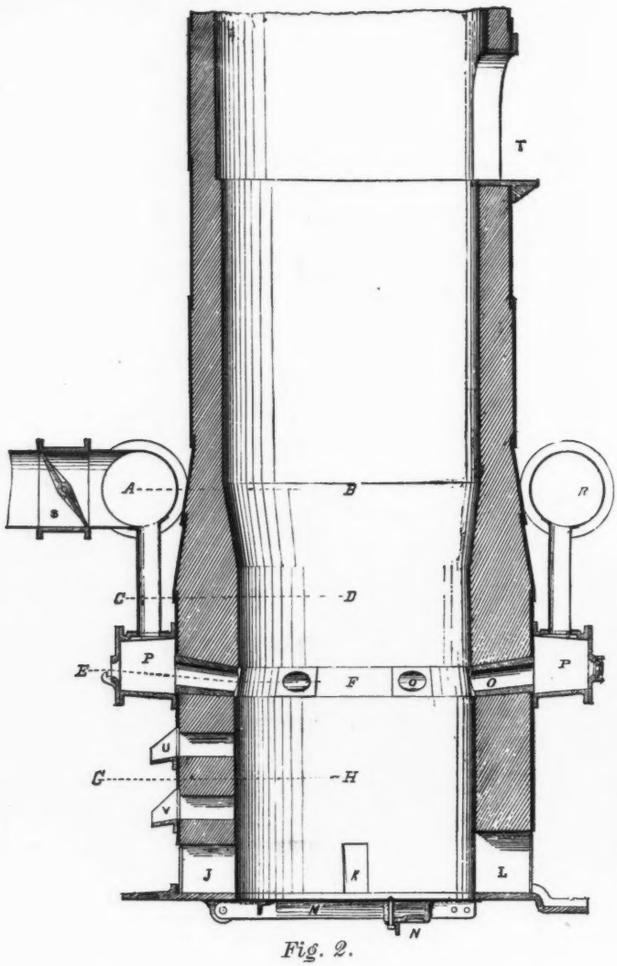


Fig. 2.

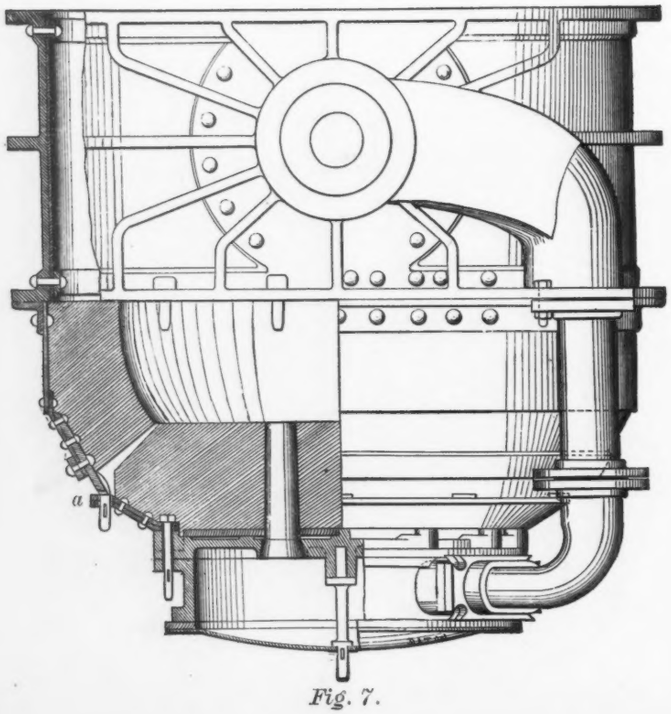


Fig. 7.

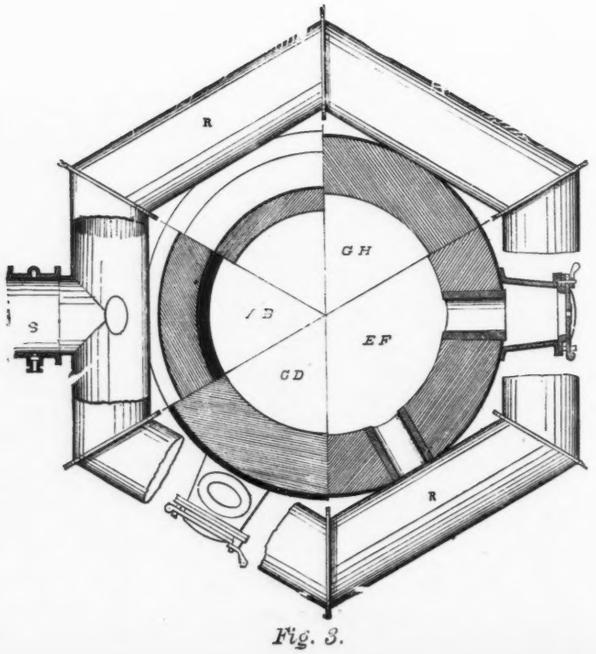


Fig. 3.

RECENT IMPROVEMENTS IN

BESSEMER MACHINERY.

Illustrating a Paper by A. L. HOLLEY, read before the American Institute of Mining Engineers, at the New York Meeting, February, 1874.

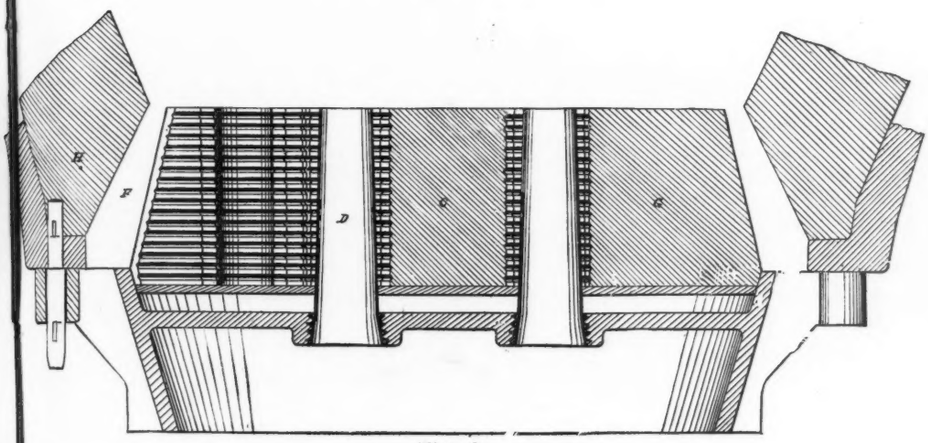


Fig. 9.

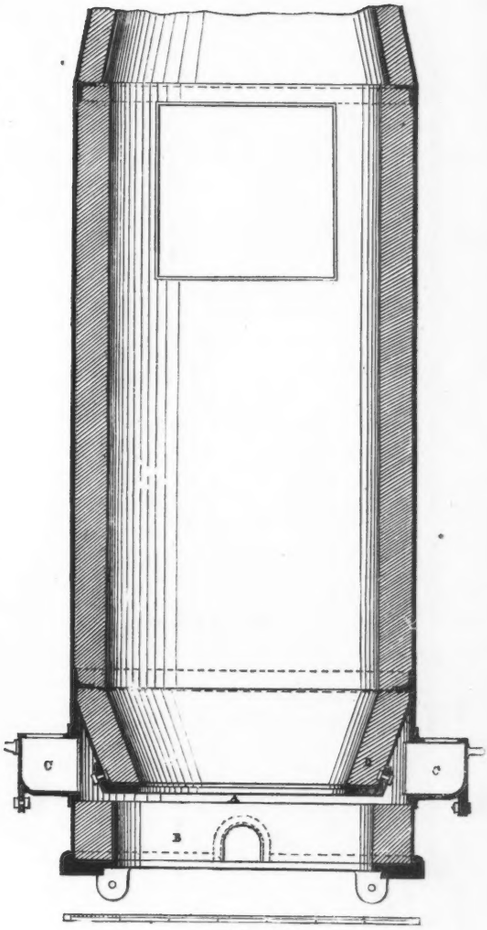
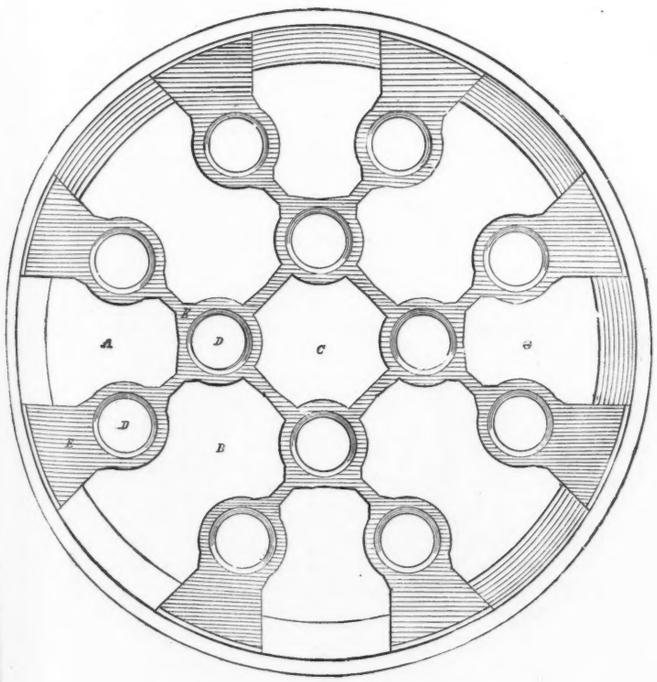


Fig. 1.



VESSEL BOTTOM AND BRICK
BETHLEHEM IRON CO

Fig. 10.

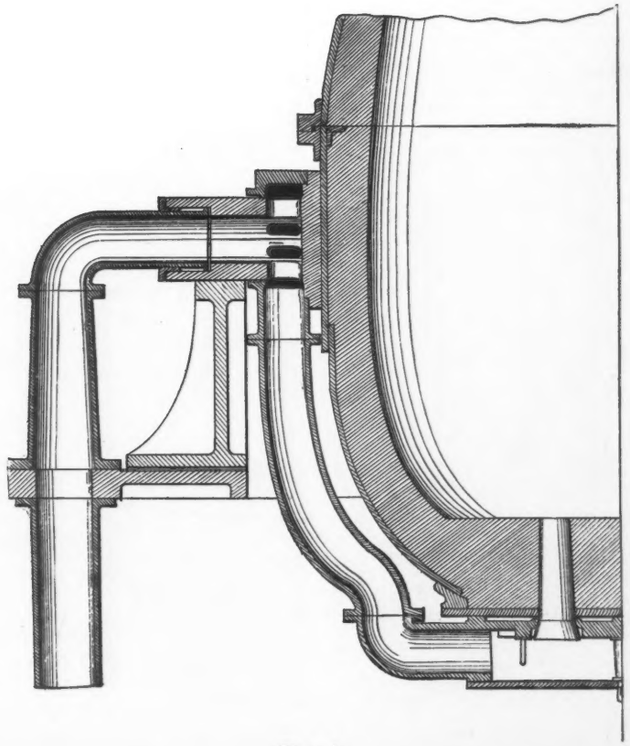


Fig. 8.

Erie, Pa. Feb. 16, 1875.

Reported by our Special Correspondent.

Wholesale, per ton of 2,000 lb.

Bituminous f.o.b.

Briar Hill lump $4 00	Beaver lump... .....$4 00

Indianapolis, Ind. Feb. 15, 1875.

Specially reported by Messrs. H. McCoy & Co.

Per ton of 2000 lb.

BITUMINOUS.

Wholesale on board cars in city.

Block coal .....$2 50@$2 75	Indiana cannel..... 6 75
Best " .....2 40@ 2 50	Hocking Valley..... 4 25
Block Nut, per car....1 8 00	Youghiogheny..... 5 00
Highland " " 18 00	Blossburg (smithing).... 6 50
Block slack, per car load.	Piedmont " 7 75
Peytona, cannel per ton.. 8 75	Gas coke, ... per bushel. 8c

ANTHRACITE (Lackawanna).

Grate.....$8 70	Chestnut..... 8 60
Egg..... 8 70	Stove..... 8 85

Retail, per bushel of 70 lb.

Block.....16c.	Peytona Cannel.....32c.
Highland.....14	Indiana " 26
Highland Nut, dom. use.. 9	Youghiogheny..... 24
Block " " .. 9	Blossburg.....26
Slack, steam, " .. 8	Piedmont.....30
Block & Highl'd Mt. steam—	

ANTHRACITE.

	per ton.		per ton.
Grate.... .....$11 00		Stove... .....$11 00	
Egg 11 00		Chestnut..... ..... 11 00	

Louisville, Ky. Feb. 16, 1875.

Specially reported by Messrs. Byrne & Speed.

Pittsburgh, per load of 1900 lb.....$3 00	
Pine Hill..... ..... 2 75	
Buckeye Cannel..... ..... 5 00	
Peytona Cannel..... 5 50	
Nut and Slack..... ..... 2 50	
Pine Hill nut..... 2 25	
Kentucky lump, per load..... ...	
" nut, "	
" Slack "	
City-made Coke, per bushel..... 10c	
Pittsburgh, wholesale, per bush.....	
Kentucky on cars at wholesale, per bush.	
Anthracite, per ton.....$10 to $10 50	

Milwaukee, Wis. Feb. 15, 1875.

Specially reported by Messrs. R. P. Elmore & Co.

The market for coal and prices remain unchanged.

Retail prices per ton of 2000 lb.

Lehigh Lump.....$10 00	Briar Hill, select..... $8 50
Lehigh Prepared..... 10 50	Blossburg..... ..... 8 00
Lackawanna..... ..... 9 50	Pittsburgh..... 7 50

New Orleans, La. Feb. 13, 1875.

Market dull with good supply. In consequence of late and prospective arrivals prices have suffered a still further reduction. We now quote :

Pittsburgh coal, retail, per bbl..... ...	75c
" wholesale..... .....30c.	
" to steamboats, per box..... .....60c.	
" to manufacturers, per bbl ....65c.	
" shipments per hhd..... .....$7 00	
Anthracite, retail, per ton $12 50	
" wholesale per ton	
Spadra (Arkansas) coal, retail, per bbl ....75c.	
Mt. Carbon, wholesale, per bbl..... .....45c.	
" " retail per bbl..... .....65c.	
Virginia Cannel, per bbl..... .....90c.	
Scotch Cannel, per bbl..... .....1 25	

Pittsburgh, Pa. Feb. 16, 1875.

Reported by our Special Correspondent.

Per ton of 2000 lb. and Bushel of 76 lb.

	per ton.		per ton
Youghiogheny coal $2 00		Pittsburgh retail delivered	
" coke..... 2 50		per bushel.....9c@10c	
Connellsville coal..... 2 10		Anth'cite on cars Lehigh.$7@75	
" coke..... 2 75		" " Wilkes-	
Pittsburgh coal..... 1 85		Barre..... 6 75	

Twenty-five to fifty cents per ton additional for delivery.

San Francisco.

From the *Commercial Herald*, Feb. 4, 1875.

Imports from January 1st to February 1st, 1875 :

Anthracite, tons..... 1,579		English, tons.....11,654	
Australian, tons..... 7,739		Vancouver Island, tons.. 6,071	
Coos Bay, tons..... 4,030		Rocky Mountain, tons.. 24	
Cumberland, tons..... 1,501		Seattle, tons..... 2,008	

Imports for the week include 1515 tons Wellington, per *Sonoma*. Supplies from Bellingham Bay, Coos Bay, etc, are at all times in order. These several Pacific Coast mines do much towards supplying household wants, while the Mt. Diablo mines contribute largely to the wants of inland steamers, and steam mills and factories. Australian supplies are in lessened stock, and there is a growing feeling that higher prices are to rule ere long. The supply of Anthracite is limited ; but of Cumberland the stock is larger than we are accustomed to carry. Low prices rule for all descriptions, and are substantially as for some time past. We quote Coos Bay at $10 ; Wellington, $11 ; Australian, by the cargo, $10@$10 25 ; Bellingham Bay, $8 50 ; Mt. Diablo sells at $8 25 for coarse and $6 25 for screenings, the latter used very extensively by factories.

St. Louis, Mo. Feb. 15, 1875.

Specially Reported by the Collinsville Coal and Mining Company.

ANTHRACITE.

Per ton of 2000 lb.

	City delivery.
Lehigh Lump.....$13 50	
Lackawanna and Wilkesbarre..... 12 50	
Semi Anthracite..... 9 50	

BITUMINOUS.

Per ton of 2000 lb.

	E. St. Louis.	City delivery
Washington Indiana—smithing.....$4 00		$4 87
O'Fallon, Ills..... 2 00		3 00
Collinsville and Belleville, Ills,..... 1 75		2 75
Indiana Cannel..... 6 00		7 00
Missouri Cannel.....		5 00

Retail, 25c. per ton additional.

Toledo, Ohio. Feb. 15, 1875.

Specially reported by Messrs. Gosline & Barbour.

Per ton of 2000 lb,

	Retail.		Retail.
Wilkes-Barre and Scranton,		Bituminous.	
Large and Small Egg, $8 35		Blossb'g and Cumberl'd, $8 00	
Stove..... 8 50		Massillon Lump..... 6 00	
Chestnut..... 8 35		Briar Hill..... 7 00	
Lehigh Lump.....10 00		Straitsville..... 3 75	
		Hocking Valley..... 4 00	

Soft coal screened retails from $4 co to $6 00, according to quality.

Halifax, N. S. Feb. 15, 1875.

Reported by our Special Correspondent.

Prices per ton of 2240 lb. in gold.

Sydney (old mines).....$4 50		Little Glace Bay..... 3 50	
Gowrie..... 3 50		Blockhouse..... 4 00	
Victoria..... 3 50		Albion (at Railroad)..... 4 25	

Montreal. Feb. 16, 1875.

Specially reported by Messrs. Robert Adams & Co.

The very cold weather has caused a heavy demand for anthracite coal, but the supply seems likely to be sufficient and prices have not advanced. Bituminous coal has remained quiet, and the depressed state of business occasions but little demand for steam purposes. To-day the contracts have been awarded for the Grand Trunk Railway supplies at International Bridge. Catfish Mine furnishes 54,000 tons at about $3.75. United States currency, and Cameron Mine 10,000 tons, at a few cents less. Twenty thousand tons, delivered by vessel at Toronto, were contracted for by Cleveland parties at $4. A party of coal men from Buffalo, Pittsburgh, and Cleveland have been awaiting the decision here.

Prices are as follows :

Wholesale per ton of 2,240 lb.

Scotch Steam.....$6 25	Cape Breton Steam..... $5 75
Pictou " 6 00	Newcastle Smiths..... ....
Anthracite at retail, 2,000 lb., delivered, less 5 per cent.	
Egg $8 50	Chestnut.. .... 9 00
Stove..... 9 50	

Toronto, Ont. Feb. 15, 1875.

Reported by our Special Correspondent.

ANTHRACITE.

	per ton.		per ton.
Broken..... $7 65		Chestnut.... .....$7 65	
Egg..... 7 65		Lehigh..... 9 00	
Stove..... 8 15			

BITUMINOUS.

Blossburgh..... 7 50	Screenings..... 5 00
Briar Hill..... 7 00	Soft Nut..... 5 50

IRON MARKET REVIEW.

New York.

Feb. 19, 1875.

American Pig.—The demand during the past week was more quiet than it has been for some time. Prices of the best brands are very firm, and in some cases higher ; while it is stated that brands of less reputation are weaker than they were. The firmness and advance in the better brands is brought about entirely by the coal strike, which shows no signs of terminating speedily, but rather of taking greater dimensions. It is certainly a serious matter for the iron interests dependent on anthracite coal. We know of one sale of 2500 tons of lump coal at South Amboy, for reshipment to furnaces on the Lehigh, at a price equivalent to $8 50 per ton delivered. This will result in a great addition to the cost of producing pig iron, and if it is to be continued for any great length of time, prices must advance or furnaces blow out. The wants of consumers of pig iron appear to be very limited, with but little indication that they will increase materially during the spring months. In the absence of important transactions, we quote nominally at $26@28 for No. 1 foundry ; $24@26 for No. 2 foundry ; and $23@26 for gray forge. There is rather a lack of inclination, on the part of some of the companies, to press business, until the supply of coal assumes a more certain form. Consumers are not willing to pay and have their iron remain here. Perhaps when the ice embargo is removed, there may be a little more activity.

Scotch Pig.—There is nothing doing in this article except in a very small way. We continue to quote : Eglinton, $33@$33 50 ; Glengarnock, $36 ; and Coltness $37@$38.

Rails.—In our last, through a typographical error, we stated that the Cleveland Rolling Mill Company had been awarded a contract for 22,500 tons of iron rails, while it should have been 12,500 tons. We only learn of a sale of 300 tons of light rails for California delivery. We nominally quote American iron rails at $48@$50 at the mills, and steel at $70@$75.

Old Rails.—We note a sale of 2000 tons for Philadelphia delivery at $29 50.

Scrap Iron.—We note a sale of 250 tons of No. 1, from yard at $35 delivered to vessel.

Boston. Feb. 13, 1875.

From the *Commercial Bulletin*.

Pig is nominally firmer. The position is one of extreme indifference among foundry men, and consequently dealers are holding out, trusting the reports from the primary markets of an improvement in demand, and that prices will hold permanent, and enable the distributing points to unload at a $30 basis for No. 1. The fancy brands of Allentown, Thomas and Crane, are quoting firm here at $30 for No. 1 ; other brands questioned as equally reliable are offering at about 50 c. less. These all in small lots. The Boston market is well supplied, the stock being ample to meet all requirements long after navigation opens. The reports from Hoboken quote No. 1, $27@$27 50 ; No. 2, $24 75@$26 ; Gray Forge, $23@$26.

Bar is moving along in rather a better spirit, but still without any improvement in values. The advance in gold, addition of duty, and better feeling quoting at the mills, have induced the visit of a good many buyers who have not been here since before Thanksgiving. On the principle that "every little makes a muckle" the trifling investments of these old friends, and the usual run of orders, have aggregated a better volume of business than has been realized in Boston in over two months. Common iron still jobs out at $56, or 2¼c. per pound, while refined is to be had at from 2⅝ to 2¾c. per pound, or $60 per ton. At these prices it would be difficult to get any quantity. The lowest mill prices are $55 on common f. o. b. cars, and $60 for refined. These quotations are Western figures, New England mills quoting $57 on common, and $61 20 on refined at the mill.

Chicago. Feb. 16, 1875.

Specially reported by Messrs. Rogers & Co., dealers in Scotch and American pig iron.

Quotations are as follows :

No. 1 Coltness ....$46 00@	
No. 1 Gartsherrie..... 45 00@	
No. 1 Summerlee..... 44 00@	
No. 1 Glengarnock ..... 42 00@	
No. 1 Eglinton ..... 40 00@	
Warner's "American Scotch"..... 41 00@	
Massilon No. 1 Foundry..... 37 00@	
No. 1 Grand Tower Mo. ores (Bituminous)..... 33 00@	
No. 2, " " " ..... 30 00@	
No. 1 Mill..... 28 00@	
Union "A" 1 (Anthracite)..... 32 00@	
Union "B" 1 (Anthracite) ..... 30 00@	
No. 1 Lake Superior (charcoal) .... 32 00@	
No. 2 Lake Superior " ..... 30 00@	
No. 3 Lake Superior " ..... 33 00@	
No. 4 Lake Superior " ..... 35 00@	
Bessemer Steel Rails..... 85 00@90 00	
New Iron Rails..... 53 00@ ...	
Old Rails..... 28 00@30 00	

Cincinnati. Feb. 16, 1875.

Specially reported by Messrs. Traber & Aubery, commission merchants for the sale of pig iron, blooms, ore, etc.

The improved demand for pig iron noted in our last continues, and prices are firm at our quotations.

CHARCOAL.

Hanging Rock, No. 1, Foundry..... .....$27 00@28 00—4 mos	
" No. 2, " ..... 26 00@27 00—4 mos	
" Mill ..... 25 00@26 00—4 mos	
Tennesse No 1, Foundry..... 26 00@27 00—4 mos	
Tennessee. No. 2 " ..... 25 00@26 00—4 mos	
" Mill..... 25 00@26 00—4 mos	
Missouri, No. 1, Foundry..... 30 00@32 00—4 mos	

STONE COAL.

Ohio No. 1, Foundry..... 26 00@28 00—4 mos	
" No. 2, " ..... 25 00@26 00—4 mos	
Ohio Mill..... 24 00@25 00—4 mos	
Missouri, No. 1, Foundry..... 27 00@28 00—4 mos	
" No. 2, " ..... 26 00@27 00—4 mos	
" Mill..... 25 00@26 00—4 mos	

CAR-WHEEL.

Hanging Rock, C. B..... 40 00@52 00—4 mos	
Tennessee " ..... 40 00@45 00—4 mos	
Missouri " ..... 40 00@45 00—4 mos	
Alabama " ..... 40 00@45 00—4 mos	

BLOOMS.

Charcoal .... 75 00@ 90 00—cash	

SCRAP IRON.

Cast..... ..... 75@ 90—cash	
Wrought .... 1 10@ 1 40—cash	

Cleveland. Feb. 16, 1875.

Specially reported by Messrs. C. E. Bingham & Co., dealers in pig iron and iron ore

The following prices show a slight advance :

No. 1, Lake Superior Charcoal..... ..... 34 00@....	
No. 2, " " ..... 32 00@....	
No. 3, " " ..... 34 00@....	
No. 4, " " ..... 35 00@....	
Nos. 5 and 6 " ..... 36 00@....	
No. 1, Bituminous foundry..... 29 00@....	
No. 2, " " ..... 27 00@....	
No. 1. " Gray Forge..... 26 00@....	
American Scotch, No. 1, Cherry Valley..... 34 00@....	
" " No. 2..... 30 00@....	
No. 1, Massillon..... ..... 32 00@....	
B—1, " ..... 30 00@....	
No. 2, " ..... 28 00@....	

Louisville. Feb. 16, 1875.

Specially reported by Messrs. George H. Hull & Co.

The market is decidedly firm, but without change in prices, except for forge irons.

The usual time, 4 months, is allowed on the quotations below.

HOT BLAST—CHARCOAL.

No. 1 foundry, from Hanging Rock ores..... $26 00@28 00	
No. 2 " " ..... 24 00@25 00	
No. 1, forge, " " ..... 24 00@25 00	
No. 1, foundry, " Tennessee " ..... 25 00@26 00	
No. 2 " " " ..... 24 00@25 00	
No. 1, forge, " " ..... 24 00@25 00	
No. 1, foundry, " Alabama " ..... 25 00@28 00	
No. 1 " " Iron Mountain " ..... 28 00@30 00	

HOT BLAST—STONECOAL.

No. 1, foundry, from Missouri ores..... .... 28 00@30 00	
No. 2, " " " ..... 27 00@28 00	
No. 1, forge " " ..... 27 00@28 00	

COLD BLAST—CHARCOAL.

Wheel from Hanging Rock ores..... 40 00@50 00	
" " Tennessee " ..... 35 00@38 00	
" " Alabama " ..... 38 00@40 00	
" " Georgia " ..... 38 00@40 00	
" " Missouri " ..... 38 00@40 00	
" " Kentucky " ..... 30 00@40 00	

Pittsburgh.

Feb. 16, 1875.

Specially reported by A. H. CHILDS, Esq., commission merchant, for the sale of pig iron, blooms, ore, etc.

The pig iron market has been quite active with advancing prices. During the past week a considerable quantity of gray forge has been sold at $24—4 mos.

San Francisco.

From the *Commercial Herald* of February 4, 1875.

There are no stocks of Pig Iron in first hands, while the consumption is unusually large. Glengarnock, to arrive next summer, No. 1, is freely offered for sale at $48@$50. Tin plate appears to be neglected, and prices both low and nominal. Outside of a steady fair jobbing trade in Bar, Bundle and Sheet Iron, we have little to remark. Banca Straits and Australian Block Tin, low and nominal.

METALS.

NEW YORK, February 19, 1875.

Gold Coin.—During the week past gold has ranged from 114⅜ to 115⅛, and closed yesterday at 115.

Bullion.—Fine silver bar is quoted at $1.25⅜@$1.26⅛; gold, per ounce, and fine gold bar at par ($20.67 gold per ounce,) to ⅛ per cent. premium.

Copper.—The sales for the week under review have been very small, and mostly at 21¾c. The asking prices to-day are 21¾c.@22c., with 21⅝c. bid. London quotations of Chili Bars remain unchanged at £83 10/.

Tin.—There is nothing doing, although the inquiry is improving. The loss of the ship *Olive*, from Singapore, with about 5000 pigs of Straits tin, bound for this market, has had a tendency to maintain the price of this brand. The latest cable advices from London quote Straits at £92, and L. & F. at £95, and from Singapore $2 50 per picul. Quotations in this market are: Straits, 21¾c.; L. & F., 21⅛@21¼c.; Refined, 21¾c.; and Banca, 25c.@25⅛c., all gold. These prices could be shaded in placing round orders. We note a sale of 5 tons of L. & F. at 21c., gold. Tin plates are quiet, but very firm, at $10@$10 25 for I. C. charcoal tins; $8 75@$9 50 for ternes; $8@$8 50 for coke tins, and $7 50@$7 75 for ternes, prices in gold.

Lead.—We note sales of about 100 tons of Domestic at $5 87½@$5 90. Foreign is held at $6 87½ on spot, and $6 75 for shipment direct from the Spanish mining companies. Selby is meeting the market, while the Government is still at $6 25. The shipments East, from Utah and Nevada, of bullion, for the month of January, amounted to 2245 tons, or up to the average monthly shipments of the whole of last year. With such large shipments, far in excess of the usual quantity for this month, when there is such extreme cold weather to contend with, the indications are that the supply from these districts will be largely increased. We also note that the Russie mines and furnaces, in this State, have resumed work, and are likely to turn out about 3 tons per day. With but a light demand, and prospects of greatly increased supplies, it looks safe to predict low prices.

Spelter and Zinc.—Spelter is very quiet at 6½c.@6¾c. currency. Foreign remains unchanged at 7¼c. gold, for common Silesian, and 7¾c. for best. Sheet zinc is quiet at 9c.@9¾c. gold.

Antimony.—There is but little doing in this article, which is quoted at 12½c.@12¾c. gold.

Quicksilver.—The London market has declined to £22 10/ per flask of 75 lb., this market to $1 55 per lb., and in San Francisco to $1 45.

Manganese.—Virginia hard Psilomelane, 2½c.; Georgia soft black manganese, 3c.; ditto hard, 2½c.; New Brunswick manganite, 4c.

FINANCIAL.

New York Stocks.

February 17, 1875.

The New York Stock Market during the past week has exhibited an unusual degree of depression. The extreme dullness of the market is attributable to the recent advance made at a late meeting of the Stock Board Governing Committee in the rate of commission, which, it is asserted, keeps large operators away from the market. We note the following recent auction sales:

1000 shares Mariposa Land and Mining Company, (hypothecated,) $100 each, at $5.

£1,750 sterling Great Republic Gold and Silver Mining Company of Virginia First Mortgage 7 per cent. Gold Bonds, due July 25, 1879, Interest Coupons payable January and July, at the Metropolitan Bank, London; 35 Coupon Bonds, £50 sterling each, registered by the New York Loan and Indemnity Company, at $80.

276 shares of the Pennsylvania Coal Company, at $245.

$1,000 Quicksilver Mining Company Second Mortgage 7 per cent. Gold Bonds, interest January and July, (First Mortgage paid off,) at 78¼.

40 shares New York Mutual Gas Light Company, at 80¾.

5000 shares Warren Railroad of New Jersey 7 per cent. Bonds, due 1875, interest February 1 and August 1, guaranteed by Delaware, Lackawanna and Western Railroad, $1,000 each, at 101½.

178 shares Philadelphia and Reading Railroad, $50 each, at 112@112¼.

140 shares Delaware, Lackawanna and Western Railroad, $50 each, at 108@107¾.

3000 shares Metropolitan Gas Light Scrip, at 130@129.

The following are the quotations:

	Highest.	Lowest.	Closing
Pennsylvania Coal Co.	—	—	247
Consolidation Coal Co.	42¾	42	42¾
Spring Mt. Coal Co.	—	—	64
American Coal Co.	—	—	52
Maryland Coal Co.	18¾	17¾	18⅜
Cumberland Coal and Iron Co.	—	—	48
N. Y. & Nova Scotia Iron Co.	—	—	116
Del., Lack. & West. R.R. Co.	109¾	109½	109¾
New Jersey Central R. R. Co.	108⅝	107½	108⅛
Delaware and Hudson Canal Co.	113¼	111¾	113⅜
Quicksilver Mining Co. prefrd.	38	36	38
" " " Common.	32½	32	32½
Mariposa Land & Mining Co.	6	5	5¾

Sales for the week, ending the 17th inst., inclusive, were as follows:

	Shares.		Price.		
Del., Lack. and W. RR.	2,433	at from	109¼	to	109¾
Del. and Hudson Canal	927	"	111¾	"	113¼
New Jersey Central RR	881	"	107½	"	108⅝
Quicksilver Mining Co.	300	"	32	"	32½
Consolidation Coal Co.	716	"	42	"	42¼
Mariposa Land & Mining Co.	600	"	5	"	6
Maryland Coal Co.	850	"	17⅜	"	18⅛
St. Louis & Iron Mountain R. R.	400	"	36	"	38
Spring Mountain Coal Co	....	"	..	"	....
Quicksilver Mining Co., prefd.	....	"	..	"	....
Pennsylvania Coal Co.	15	"	247½	"	....
Total Sales	7,122	shares.			
Sales for the week previous	9,878	"			
Decrease	2,756	"			

The following are the sales of bonds for the same period:

	Amount.		Price.		
Del., Lack. & W. RR. convertible,	$	at from	..	to	....
N. J. Central RR. 1st consolidated mortgage bonds	30,000	"	104¼	"	105
N. J. Cent. RR. conv'tible bonds,	10,000	"	106¾	"	....
St. Louis & Iron Mount'n 1st Mtg bonds, due in 1897	....	"	..	"	....
St. Louis & Iron Mountainn. 2d Mtg. bonds	....	"	..	"	....
N. J. Central 2d Mtg. bonds	....	"	..	"	....
" " 1st Mtg. Reg. bonds,	....	"	..	"	....
Del. & Hudson Canal, 1st Mtg. Reg. bonds, 1891	....	"	..	"	....
Del. & Hudson Canal, 1st Mtg. Reg. bonds, 1884	15,0000	"	105¾	"	....

Philadelphia Stocks.

Feb. 16, 1875.

The Philadelphia stock market during the operations of the past week has been characterized by extreme dullness; the sales of both stocks and bonds have been much below the average, with prices nominally unchanged.

The Crane Iron Company announces a dividend of 3 per cent., payable on demand.

The American Coal Company of Allegheny County, Md., announces a semi-annual dividend of 3 per cent., payable March 10.

Quotations are as follows:

	Lowest.	Highest.	Closing.
Reading R. R. Co.	56½	57	57
Lehigh Valley R. R. Co.	62⅝	63¼	63¼
Little Schuylkill R. R.	—	—	48
Catawissa R.R.	20	20½	20
" " Preferred	—	—	42¾
Huntingdon and B. T. R.R.	—	—	7
" " " " Preferred.	13	14	13
Minehill R.R.	53	53½	53
Lehigh Coal and Navigation Canal.	51⅛	51¾	51⅜
Morris Canal	—	—	50
" Preferred	—	—	123¾
Pennsylvania Canal	—	—	—
Schuylkill Navigation Canal	—	—	7⅜
" " Preferred	14⅞	15	14⅞
Susquehanna Canal	—	—	8
Westmoreland Coal Co.	—	—	91
Buck Mountain Coal Co.	—	—	33
Cambria Iron Co.	—	—	17¾
Locust Mountain Coal Co.	—	—	45

The following are the aggregate sales of stocks for the week ending Feb. 16th:

	Shares.		Price.		
Reading Railroad	3,584	at from	56½	to	57
Lehigh Valley RR. Co.	1,830	"	62⅝	"	63¼
Little Schuylkill RR.	..	"	..	"	..
Catawissa RR.	1,000	"	20	"	20½
" " preferred	86	"	42¾	"	..
" " new preferred	168	"	36½	"	36⅞
Huntington and B. T. RR., p'f'd.	300	"	14	"	..
Minehill RR.	36	"	53	"	53⅜
Lehigh Coal and Navigation Canal.	11,239	"	51⅛	"	51¾
Schuylkil Navigation Canal	10	"	7¾	"	..
" " p'f'd	710	"	14⅞	"	15
Morris Canal, preferred	24	"	124½		
Susquehanna Coal Co.	3,000	"	62		
Total sales	21,963	shares.			
Sales for week previous	26,845	"			
Decrease	4,882	"			

Sales of the various bonds for the period under review have been as follows:

	Amount.		Price.		
Reading RR. 6s, 43-80	$	at	..	to	....
Catawissa RR., new 7s	....	"	..	"	....
H. and B. T. RR., consolidated bonds.	....	"	..	"	....
Lehigh convt. gold loan	....	"	..	"	....
Pa. and N. Y. Canal, 7s	2,000	"	106	"	....
Schuyl. Nav. 6s, '82	2,700	"	81	"	....
L. V. RR. 6s, coup.	2,000	"	102	"	103¾
H. and B. T. 1st mort. 7s	....	"	..	"	....
R. C. and I. Co. irregular mort. bonds, Hill Tract	....	"	..	"	....
Lehigh Nav. 6s, 1877	13,000	"	100¾	"	100⅞
Reading RR. debenture bonds	...	"	..	"	..
" " R. G. M. 7s, coupons	7,000	"	106	"	106¾
" " new convertible 7s	18,000	"	105	"	....
Reading C. and I. Co. debenture bonds.	11,000	"	78	"	79
Reading C. and I. Co. mort. bonds, Tamaqua Tract	....	"	..	"	....
Reading C. and I. Co. mort. bonds, St. Clair Tract	....	"	..	"	....
R. C. & I. Co, Wetherill tract	1,000	"	92½	"	....
" " " " Locust Mountain Summit Improvement tract	1,000	"	91	"	....
Lehigh Valley RR. 6s, registered	3,000	"	102¾	"	103
" " " 7s	1,000	"	108¾	"	108½
Lehigh Coal & Nav. Co. 6s, gold loan.	23,000	"	100	"	100⅛
" " " " 6s, RR. loan	400	"	100	"	....
" " " " 6s, 1884	6,600	"	100	"	100⅜
Schuylkill Nav. 6s, '72	1,000	"	94	"	....
" " 7 per cent. boat loan	....	"	..	"	....
" " 6 " " " "	....	"	..	"	....
" " Dividend scrip	557	"	90½	"	91¼
R. C. & I. Co., Glentworth tract	20,000	"	91	"	91¼
Chesapeake & Delaware Canal, 6s.	....	"	..	"	....
Susquehanna Canal, 6s.	8,000	"	77	"	78
Pennsylvania Canal, 6s.	4,000	"	71	"	71¾
Shamokin Valley & Pottsville R.R., 7s.	....	"	..	"	....

Gold and Silver Stocks.

SAN FRANCISCO, Feb. 17, 1875.

The San Francisco Stock Market continues to exhibit the irregular tendency noted in our last. Consolidated Virginia and California are still declining, the list, however, outside of these items, and excepting a decline of $13 per share in Overman, is firm with a general advance over our quotations of the 10th inst. The Consolidated Virginia Mining Company has declared a dividend of $3 per share payable on the 11th inst. An assessment of $3 per share has been levied by the Raymond & Ely Mining Company, delinquent Feb. 26th. Quotations, Feb. 17, 1875:

Gould & Curry	21	Overman	50
Savage	120	Raymond & Ely	36
Chollar Potosi	61	Eureka G. V.	8
Ophir	79	Best & Belcher	56
Hale and Norcross	45	Kentuck	15
Crown Point	33	Meadow Valley	6
Yellow Jacket	82	Alpha	17
Belcher	39	Sierra Nevada	12
Imperial	9	Union Consolidated	8
Consolidated Virginia	433	Mexican	27
California	50	Caledonia	18

Copper Stocks.

BOSTON, Feb. 18, 1875.

Copper stocks exhibit a slight advance on our quotations of last week, with an increase in transactions. These sales during yesterday's operations of the Board were as follows: 13 shares of Calumet and Hecla at $145; 5 shares of Copper Falls at $9⅛, and 50 shares of the Quincy Mining Company at from $35⅞ to $36 per share. We note some recent transactions of the Ridge Mining Company in pretty large amounts at $6 per share. A recent number of the *Portage Lake Mining Gazette* say that "There were legitimately worked during 1874 on Lake Superior seventeen copper mines, four of which have declared dividends from the earnings that year as follows:

Calumet and Hecla	$1,000,000
Quincy	160,000
Central	80,000
Ridge	20,000

Besides the above four mines, at least three others in the list made more than their expenses, and probably the coming year will do something for their stockholders.

Allouez	6	Pewabic	—
Calumet and Hecla Co.	145	Phœnix	12
Copper Falls	9⅛	Quincy	36
Central	22½	Ridge	5¾
Franklin	—	Rockland	1

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues (ten dollars per annum) are payable on election and at the annual (May) meeting. Members and associates elected at the February meeting pay ten dollars only to May of the following year. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

III. The February meeting of the Institute will be held in New Haven, Conn., on the 23d inst. The first session will be held in the Sheffield Scientific School, at 8 o'clock, P. M.

IV. Blank proposals for membership can be had on application to the Secretary.

V. The second volume of Transactions has been mailed to all home members and associates not in arrears. Any member who failed to receive his copy will please notify the Secretary promptly. The Institute is not responsible for the loss of the volume in those cases where members have changed their residences and have omitted to inform the Secretary. Volumes I. and II. will be sent, post-paid, to non-members, at five dollars each.

VI. Members are earnestly requested to inform the Secretary promptly of any change of address.

THOMAS M. BROWN, Secretary, Lafayette College Easton, Pa.

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The firm of BIRD, PERKINS & JOB has been this day dissolved by mutual consent. MR. SAMUEL T. BIRD, the senior member, retiring. Either partner will sign in liquidation.

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NEW YORK, February 1, 1875.

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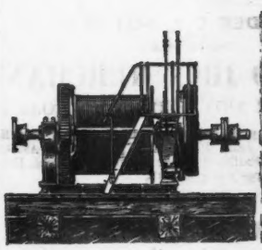

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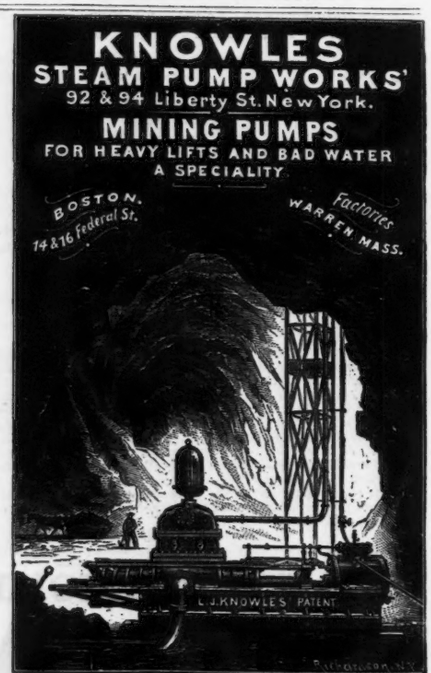

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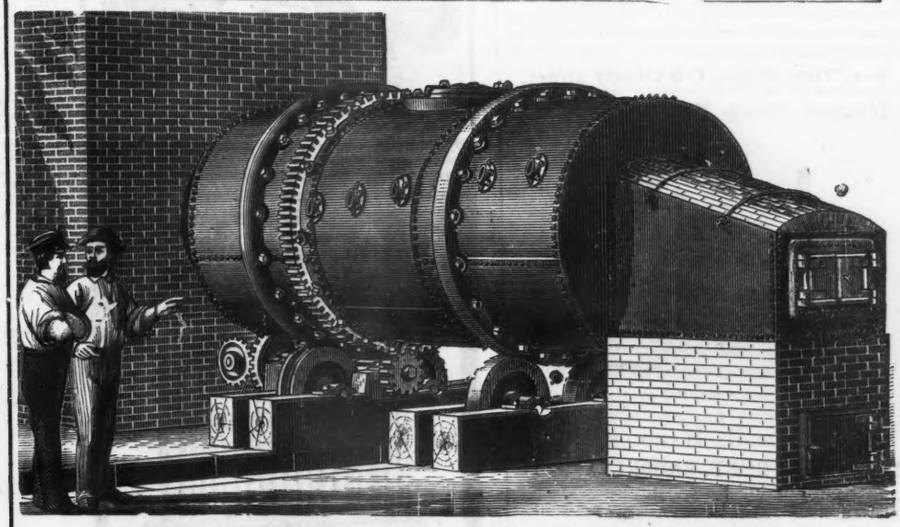

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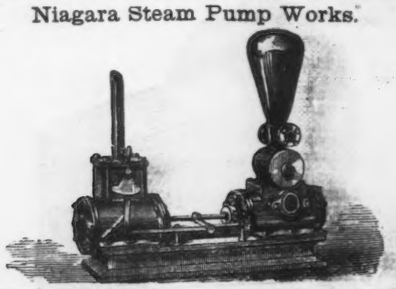

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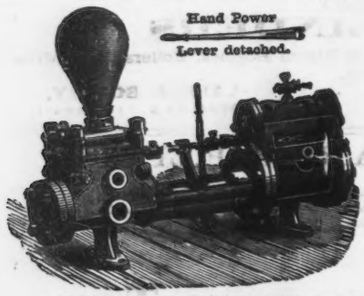

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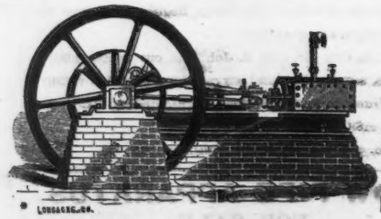

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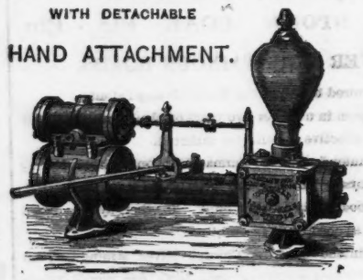

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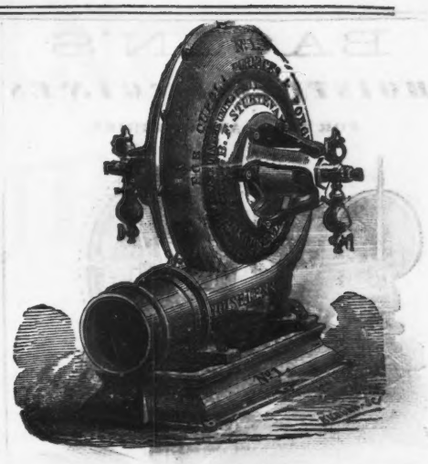
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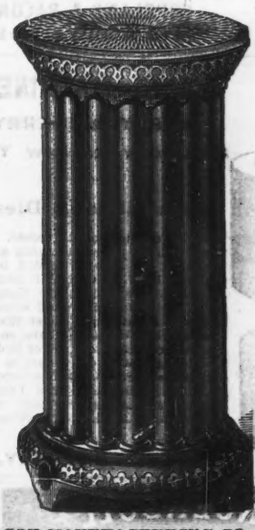
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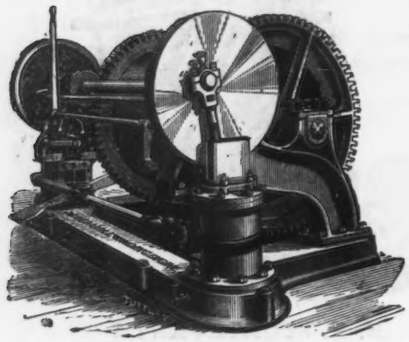

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